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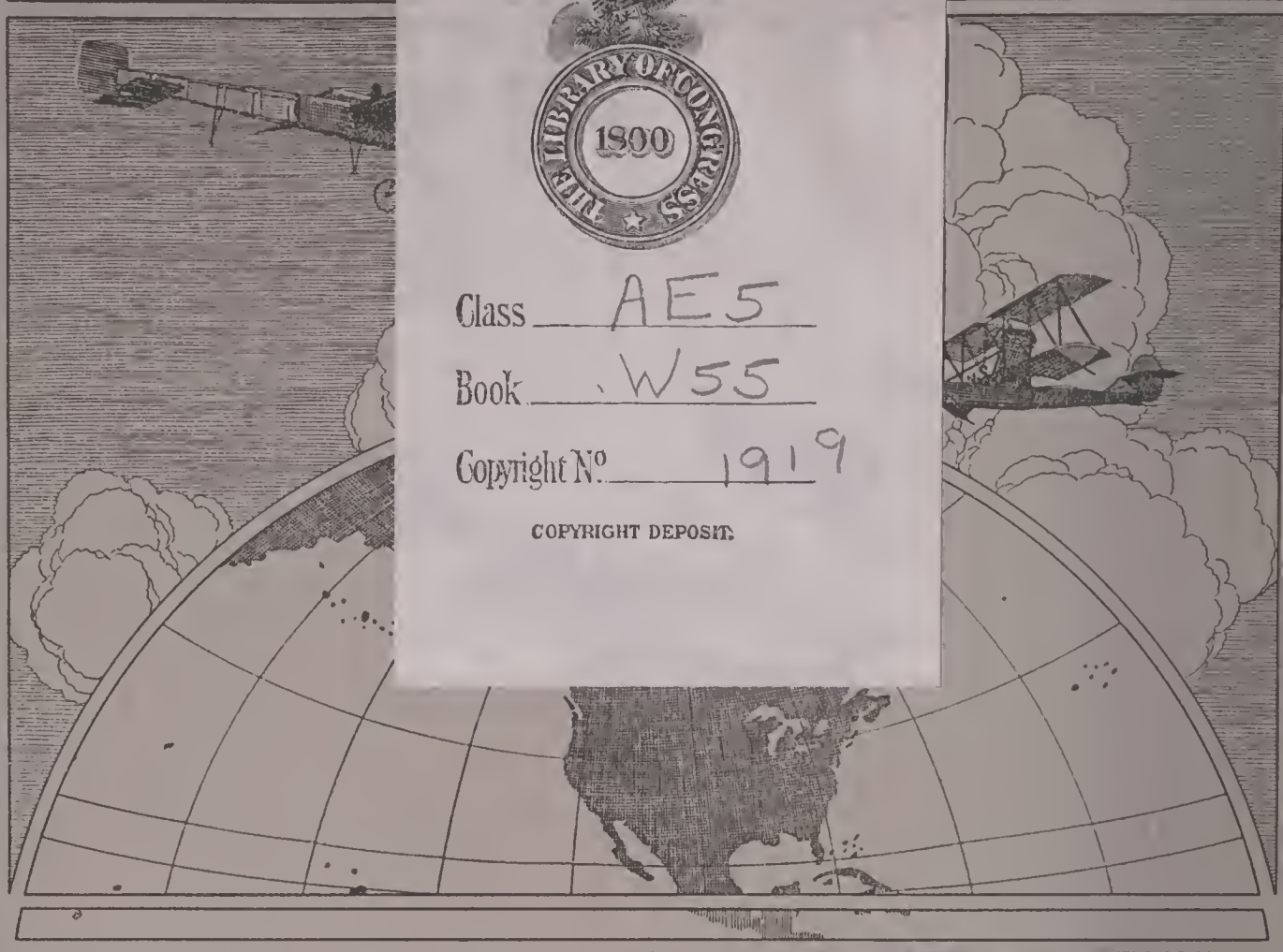
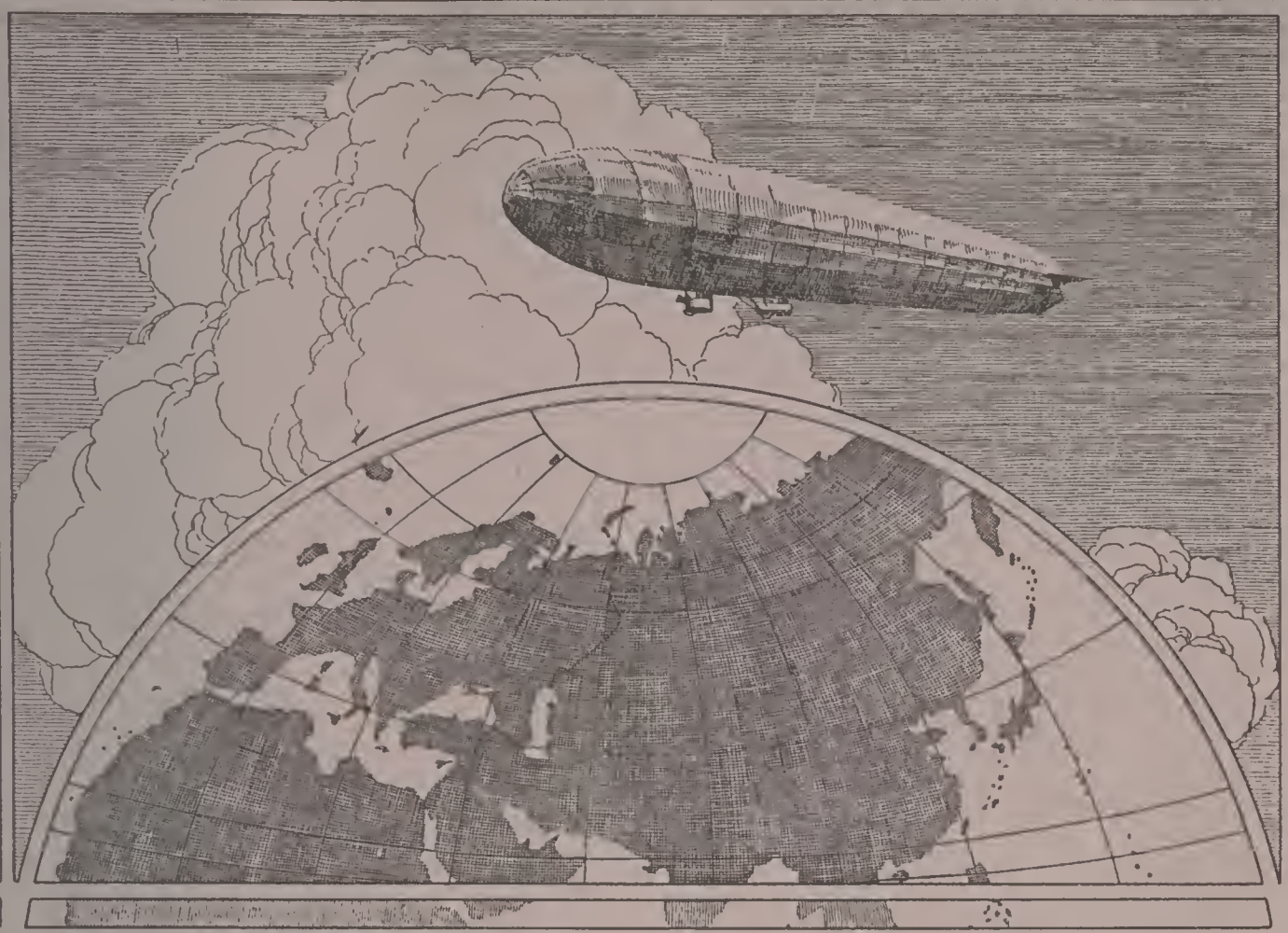


# THE WORLD BOOK



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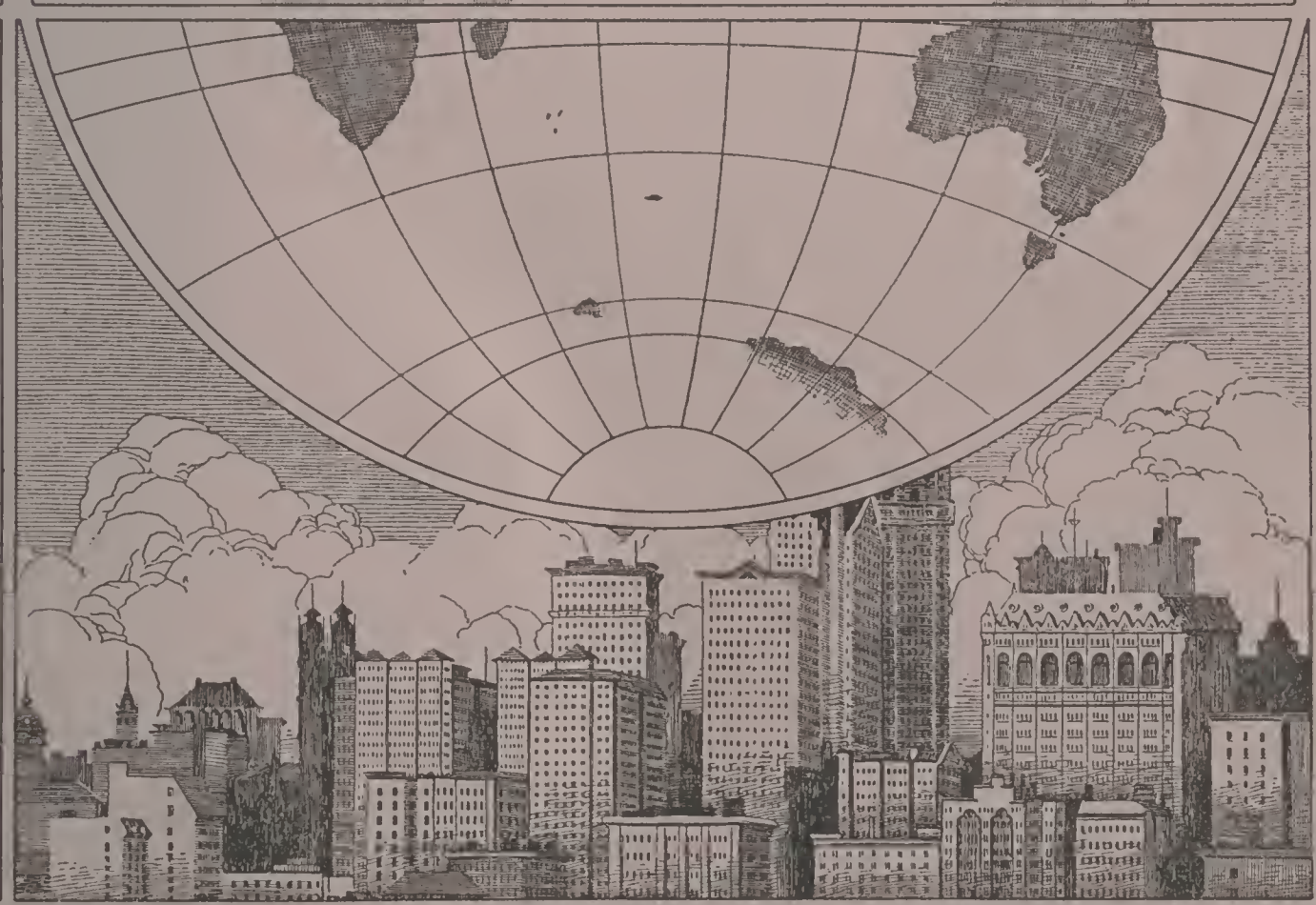

# THE WORLD BOOK

ORGANIZED KNOWLEDGE IN STORY AND PICTURE

TRADE MARK REGISTERED


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*In Ten Volumes* — *Volume Nine*

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1919

W. F. QUARRIE & COMPANY

TORONTO CHICAGO NEW YORK

AE 5
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1919

# THE WORLD BOOK

ORGANIZED KNOWLEDGE IN STORY AND PICTURE

NOV 14 1919

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**SCHOOL GARDEN.** In the great movement which has as its slogan "Back to the farm," the school garden is having no slight influence. Today there are in Europe over 100,000 gardens cultivated by pupils, and the School Garden Association of America has members in every state in the Union and in most of the Canadian provinces, as well as in the dependencies of the United States. A garden is a practical laboratory in which the pupils gain first-hand knowledge of the principles of nature study, agriculture, botany, manual training and physical exercise, and gardening is easily correlated with arithmetic, geography, drawing, composition, bookkeeping and other school subjects. Furthermore, the cultivation of the soil is of fundamental importance in helping solve the problem of keeping the world's population fed. School gardens are, therefore, an advantage from every point of view.

Best results are achieved in those communities where the school garden is conducted as a part of the regular curriculum, and the board provides a specially trained instructor to direct the regular teachers and to supervise the work. At the same time much has been accomplished by schools not so fortunately provided for. In some communities the gardening has to be done outside of regular school hours, but even so the results have been such as to create favorable interest in the movement throughout the community. The question of space is also a problem that must be dealt with differently in different localities. If possible, the school-garden plots should be in or adjacent to the school yard. If it is impracticable to give each pupil a separate plot to take care of, the garden may be divided into rows. Every pupil should have a definite work to do, and be required to record the results of his work in a permanent booklet. Where the space is very limited the teacher should encourage the planting of window-box gardens. Even the borders along the edges of yards can be utilized.

In addition to the advantages already mentioned a school garden is an economic gain of no mean importance. The money value of what such a garden can produce is often surprising; the lessons the pupils learn from turning labor into cash or its equivalent is in the highest degree educational. Here many boys and girls discover for the first time that wealth lies inherent in the soil. It may be that the home consumes all the products of a garden plot, but even so, the lesson conveyed need lose none of its emphasis.

In the articles BOYS' AND GIRLS' CLUBS and GARDENING will be found the practical details one needs to know in carrying on gardening work of this nature. The Division of Home and School Gardens, of the United States Department of Agriculture, will respond to all requests for help and information. See, also, list of Related Subjects, in article GARDENING.

**SCHOPENHAUER,** *sho'pen hou er,* ARTHUR (1788-1860), a German scholar who formulated a system of pessimistic philosophy. He believed that the only "necessary reality in the universe is will," and by will he meant blind force, capricious and contrary as often as it was rational. There is, therefore, no reason to believe that things will ever be better. To secure happiness one must restrain all desires and appetites and aspire to a condition of negation similar to the Nirvana of Buddhism (which see). Schopenhauer was born in Danzig, Prussia. In 1809 he began the study of medicine at Göttingen University, but abandoned it for the study of philosophy; in 1813 he was graduated from the University of Jena. Between 1814 and 1818 he made Dresden his home, writing at this time his greatest work, *The World as Will and Idea.* Later he endeavored to lecture in Berlin in opposition to Hegel, the apostle of idealism, but was unsuccessful (see HEGEL, GEORG WILHELM). Disappointed and embittered, he removed to Frankfort-on-the-Main, where he spent several years in seclusion. Late in his life and after his death the fame he had longed for attached itself to his name. Though he overemphasized the tragic aspect of life, he performed a worthy service in the field of speculation.

**SCHUBERT,** *shoo'bert,* FRANZ (1797-1828), a German musician to whom the nations owe a debt of gratitude, for he is the composer of some of the world's greatest songs. His *Erlking; Hark, Hark the Lark; Wanderer, Serenade* and many others are unsurpassed in melody and charm, and are known to countless lovers of music the world over. Liszt characterized Schubert as the "most poetic musician that ever lived." He was born at Vienna of a musical family, and at home learned the fundamentals of piano and violin playing. His subsequent mastery of instrumental playing and of composition, however, came about largely through independent study and association with the best musicians of his time. He began to compose before he was fourteen, and his famous *Erlking* and *Wanderer* were created when he was only nineteen. Schubert was long hampered by poverty and lack of public recognition of his genius. He had to devote much precious time to the drudgery of teaching, and none of his compositions was published until 1821. His immature death, when he was but thirty-two, was the result of overwork and a bitter struggle with poverty and disappointment.

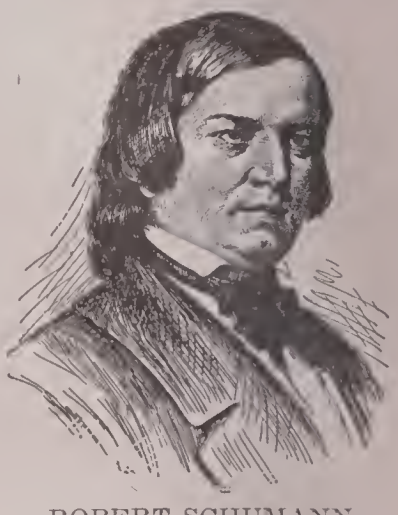
FRANZ SCHUBERT

It is a remarkable tribute to the creative genius of the young composer that in spite of these handicaps he left to posterity over 600 songs, nine symphonies, two of which—the *Unfinished in B Minor* and *Symphony in C Major*—are famous; numerous instrumental pieces for piano and violin, masses, choruses, operas and an oratorio. His songs alone would place him among the immortal masters, but some of his instrumental compositions are of imperishable fame. Schumann's well-known tribute to Schubert is an excellent summary of his genius:

> He has strains for the most subtle thoughts and feelings, nay even for the very events and conditions of life; and innumerable as are the shades of human thought and aspiration, so various is his music. Whatever his eye beholds, whatever his hand touches, turns into music.

Consult Duncan's *Schubert;* Mason's "Schubert," in *Romantic Composers.*

**SCHUMANN,** *shoo'mahn,* ROBERT (1810-1856), a German musician who ranks with Schubert as a composer of songs, and with Chopin and Liszt as a master of piano technic. He was born at Zwickau, Saxony. Schumann's mother wished him to become a lawyer, and the boy registered as a law student at the University of Leipzig when he was eighteen. His musical preferences, however, were too strong to admit of his adopting the legal profession. At the age of eleven he had set the 150th Psalm to music, but he seems to have had no systematic instruction in music until he settled in Leipzig. There he became the pupil of Friedrich Wieck, whose daughter Clara, herself a skilful pianist, became his wife in 1840. Under Wieck's instruction Schumann made rapid progress, but his career as a pianist was cut short by a permanent injury to one of his fingers, the result of overzealous practice. He had determined, however, to abandon the profession of law, and at the age of twenty-one took up definitely his work as composer and musical critic.



ROBERT SCHUMANN

In 1824 he joined with several other young enthusiasts in founding a journal *(Neue Zeitschrift für Musik)* for the encouragement of high ideals in music. Through this periodical Schumann called the attention of the public to the genius of Chopin, and gave loyal support to such rising musicians as Schubert, Mendelssohn and Berlioz. The period between 1834 and his marriage to Clara Wieck was rich in the products of his own genius, for it gave to the world his first symphony and some of his finest songs. Between 1840 and 1844, when he removed to Dresden, he composed the beautiful Cantata *Paradise and the Peri* and a famous quintet for the piano, and in the latter year began his composition of the music for Goethe's *Faust.* In 1850 the Schumanns removed to Düsseldorf. During their sojourn here the composer's mind and health broke down, and he died in 1856 in a private asylum for the insane near Bonn.

As a song writer Schumann is regarded as a disciple of Schubert, but he surpassed the latter in ability to make the music express the

varying shades of feeling represented by the words. His songs were written to poems of Goethe, Heine, Byron, Burns, Moore and other lyrists. Schumann's wife edited his complete works, which fill thirty-four volumes. B.M.W.

Consult Oldmeadow's *Schumann;* Mason's "Schumann," in *Romantic Composers.*

**SCHUMANN-HEINK,** *shoo'man hyngk',* ERNESTINE, née RÖSSLER (1861- ), one of the greatest contraltos of her age, a marked favorite both as a grand opera star and as a concert singer. She was born at Lieben, in Bohemia. At the age of seventeen she appeared in Dresden in her first grand opera rôle, that of Azucena in *Il Trovatore,* and for many years thereafter sang in various parts of Germany. In 1883 she was married to a Mr. Heink, and ten years later to Paul Schumann. Madame Schumann-Heink gave her first performance in an American city at the Metropolitan Grand Opera in New York, in 1898, and she occasionally appeared thereafter as a guest artist with the Chicago organization. Though she is preëminently successful in the majestic contralto rôles of Wagner's operas, her deep, rich voice is enjoyed quite as fully when she sings simple folk songs in her recitals. She raised a large family of children and has simple, domestic tastes. During the War of the Nations two of Madame Schumann-Heink's sons enlisted on the side of America, and one of them fought for Germany.

ERNESTINE SCHUMANN-HEINK

**SCHURMAN,** *shoor'mahn,* JACOB GOULD (1854- ), an American university president, born at Freetown, Prince Edward Island. He received his early education in Canada, where he won the Gilchrist Dominion Scholarship in 1875. Later he studied at the Edinburgh University, and, having been elected to the Hibbert traveling fellowship in 1878, spent two years at Heidelberg and Berlin. When twenty-six years of age he was appointed professor of psychology and English literature in Acadia College. Two years later he was appointed to a similar position at Dalhousie College. In 1886 he became a member of the faculty of Cornell University, at Ithaca, N. Y., as professor of philosophy, and in 1891 was made dean of the Sage School of Philosophy at Cornell. In 1892 he was elected president of the university.

President McKinley appointed Professor Schurman chairman of the first United States Philippine Commission in 1899, and he spent a year in the islands. In 1912 he was appointed by President Taft United States minister to Greece and Montenegro. He is the author of *Kantian Ethics and the Ethics of Evolution; The Ethical Import of Darwinism; Belief in God, Agnosticism and Religion; A Generation at Cornell; Philippine Affairs, a Retrospect and Outlook* and *The Balkan Wars, 1912-'13,* a course of lectures delivered at Princeton.

**SCHURZ,** *shurtz,* CARL (1829-1906), a German-American soldier, statesman and editor, a champion of freedom in two countries. In the words of former President Eliot of Harvard, he was "the greatest American citizen of German birth."

Carl Schurz was born at Liblar, Prussia, and was educated at the University of Bonn, where he aided in the publication of a newspaper of liberal tendencies. He escaped arrest during the revolutionary period in 1848 by hurrying to Switzerland; from there he worked his way to Paris, where he served as correspondent to German papers. He next went to London and then emigrated to America (1852), hoping there to carry out his theories of universal liberty. He became a citizen of Wisconsin, found support as a journalist and lawyer, and became celebrated as an eloquent orator, for he had acquired a remarkable command of English. He was a delegate to the Republican national convention which nominated Lincoln, and was rewarded for his campaign services by appointment as minister to Spain. This position he resigned on the outbreak of the War of Secession. Schurz was commissioned brigadier-general in 1862 and major-general in 1863, and took part in the battles of Bull Run (second), Chancellorsville, Gettysburg and Chattanooga.

CARL SCHURZ

After the war capitalists assisted him in establishing a German paper in Saint Louis (the *Westliche Post*) which became a power in the West. In 1869 he took his seat as United States Senator from Missouri, being the first American citizen of German birth to enter the Senate. He was one of the first to oppose Grant's reëlection, and presided over the convention which nominated Greeley for the Presidency. When Hayes became President Schurz was appointed Secretary of the Interior, serving from 1877 to 1881. In the latter year he became editor-in-chief of the New York *Evening Post,* formerly edited by William Cullen Bryant. The *Post,* which had been popularly regarded as the personal organ of Mr. Bryant, increased in circulation and influence under the management of the new chief, who, however, retired from the editorship in 1883. In 1892 he was elected president of the National League for Civil Service Reform, and after nine years resigned on account of his declining strength. He died in New York City, May 14, 1906.

Schurz published a volume of *Speeches,* a book of *Reminiscences,* a biography of Henry Clay in the "American Statesmen Series," and an admirable essay on Lincoln. M.R.T.

**SCHUYLER,** *ski'ler,* PHILIP (1733-1804), an American patriot, statesman and Revolutionary general, distinguished for the part he bore in the campaign which ended in the surrender of Burgoyne. He was descended from Dutch ancestors who came from Holland and settled in Albany, N. Y., where he was born. In 1755 he recruited a company to fight against the French and Indians and showed unusual military skill. Later he engaged in business in Saratoga, where he built the first American flax mill. Schuyler was a delegate to the Continental Congress in 1775, and after the Battle of Bunker Hill was appointed major-general in the continental army, being placed in command of the Northern New York division. His command of the colonial forces, however, did not long continue, as Gates managed to have himself unfairly appointed by Congress in his place; but Schuyler remained with the army, and to him is due the credit of Burgoyne's surrender (see SARATOGA, BATTLES OF). For alleged neglect of duty at Ticonderoga he was tried by court-martial, but was acquitted with honor. He secured the neutrality of the Six Nations and was later elected to numerous state offices, and to the United States Senate. He is buried in Trinity Churchyard, New York City, within a hundred feet of busy Broadway, and next to the grave of his father-in-law, Alexander Hamilton.

**SCHUYLKILL,** *skool'kil,* a river in Pennsylvania, whose name is a Dutch word meaning *hidden channel.* It rises in a county of the same name, and flows southeastward for about 100 miles, entering the Delaware River at the southern limit of Philadelphia. It furnishes water power for manufacturing at Reading, Pottsville, Phoenixville, Norristown and Philadelphia. Along its lower portion in Philadelphia there are extensive wharves. The greater portion of the water supply of the city also comes from the Schuylkill, the government having installed a filtration plant in 1901-1908 at a cost of $25,000,000. By a Congressional appropriation (1914) funds were provided to widen the Schuylkill channel from Walnut Street, Philadelphia, to the Delaware, for port development.

**SCHWAB,** *shwahb,* CHARLES M. (1862- ), an American capitalist who amassed a great fortune in the steel industry. He was born at Williamsburg, Pa., but spent his childhood in Loretto, in the same state. While still a boy he drove a stage from Loretto to Cresson, a distance of five miles. Schwab's connection with the steel industry began with his employment by the Carnegie Company as a stake driver in the engineering corps of the Edgar Thompson Steel Works. He rose steadily to the position of general superintendent of the Homestead Steel Works, serving in this capacity from 1892 to 1897. He later devoted his energies to putting the steel industry on a "trust" basis, and in 1901 became president of the vast United States Steel Corporation. In 1903 Schwab became president of the Bethlehem Steel Corporation, and in 1918 he was called to manage the great shipbuilding enterprise of the government, during the War of the Nations.

CHARLES M. SCHWAB

**SCHWATKA,** *shwot'ka,* FREDERICK (1849-1892), an American Arctic explorer, born at Galena, Ill. Graduating in 1871 from West Point, he became second lieutenant in the United States army, after obtaining degrees in both medicine and law. Becoming interested in Arc-

tic exploration, he obtained leave of absence in 1878 and undertook an expedition in search of records and remains of Sir John Franklin and his party. He traveled by sledge a distance of almost 3,000 miles, and explored carefully the northern coast of America in the region where Franklin had been, and a part of King William Land. His search was rewarded by the discovery of graves, skeletons and valuable buried records. This was the last expedition sent out to look for traces of Franklin. Later Schwatka headed other exploring parties, in Alaska and in Mexico, and received honors from various scientific societies. He resigned his commission in the army in 1885. His published works include *Along Alaska's Great River, Nimrod in the North* and *Children of the Cold.* See POLAR EXPLORATION.

**SCIENCE AND THE SCIENCES.** The question "Why?" has probably been asked more times in the history of the world than any other. It is the favorite question of children, and as even the wisest of men are but children in knowledge, it has been the constant query of mankind since it was first uttered. The answers which men have found, the organized knowledge they have acquired by observation and reasoning, make up what we call the sciences. The word *science,* standing alone, means merely *knowledge;* it comes from the Latin word *scio,* to know.

The truly scientific student never jumps to a conclusion. No matter how logical an explanation appears, or how plausible a statement may be, he must treat it as a *hypothesis,* or *supposition,* until it is proved beyond doubt. He works from his knowledge of the universal law of cause and effect, which tells him that any set of circumstances always produces the same results, and that in nature there are no exceptions to a rule. A good example of the scientific attitude is the story of the discovery of the planet Neptune, told in the article ASTRONOMY.

**The Sciences.** In ancient times, and even during the Middle Ages, there was little attempt to differentiate between the sciences, for scientific knowledge was limited. A distinction was drawn between the theoretical and the practical sciences, but that was in effect merely a distinction between what would to-day be called philosophy and science proper. Until modern times the general term *natural history* was in common use to describe the study of all life, whether plant or animal; while *natural philosophy,* or *physics* included the study of all inorganic phenomena. As scientific knowledge increased, however, a more and more close classification became necessary. To-day the sciences are divided and subdivided, and a student often specializes in but a subdivision of a science, while possessing but a general knowledge of the entire broader subject.

Thus the sciences named in the following list are not all coördinate in value; ethnology and ethnography, for instance, are branches of anthropology, while botany and zoölogy are divisions of biology. All, however, have the right to be considered as sciences, and all are treated under their proper headings in these volumes:

Algebra
Anatomy
Anthropology
Archaeology
Arithmetic
Astronomy
Biology
Botany
Chemistry
Economics
Ethnography
Ethnology
Eugenics
Geodesy
Geography
Geology
Geometry
Mathematics
Meteorology
Minerals and Mineralogy
Numismatics
Oceanography
Paleontology
Philology
Philosophy
Phonetics
Physics
Physiology
Psychology
Sanitary Science
Sociology
Zoölogy

Under many of the articles above are given lists of scientists; thus the distinguished chemists whose biographies appear in these volumes are listed under CHEMISTRY, the geologists under GEOLOGY, and so on. Certain scientists, however, who cannot be thus classified, are indexed here:

Finsen, Niels Ryberg
Galton, Sir Francis
Henry, Joseph
Kelvin, Baron
Langley, Samuel P.
Loeb, Jacques
Metchnikoff, Elie
Tyndall, John

C.H.H.

Consult Pearson's *Grammar of Science.*

**Pseudo-Sciences.** This term is useful to describe the several pursuits which in one view constitute the antecedents of modern science, and in another show the survival of outgrown habits of thought and the persistence of the cruder products of inquiry. These beliefs and practices form a significant part of the history of thought and of the struggle of men to guide conduct by knowledge. The pseudo-sciences arose as ambitious attempts to explain the world of things and events and the unseen world of spirits and forces patterned upon the fears and desires of men. They proceed from rather vague notions to systematic conceptions; their logic is weak and involves a confusion of

wish and fact, of imagination and reality. The demand for proof is slight, and the satisfaction of belief urgent. At every stage the mind reaches out for a complete solution, for some system of explanation that makes a whole out of detached happenings, and furnishes some sort of clue to the meaning of existence. In the course of such pursuits a considerable body of observations accumulates; but these are held together by the system that is imposed upon them. At early stages such lore is religion and philosophy and science in one; out of the notions thus favored, and thus developed by systematic interpretation, crudely scientific, the earlier pseudo-sciences arise. The later ones have a different history. The best known of these, such as alchemy, astrology, palmistry and others listed below, are treated in these volumes.

A common motive of these pursuits is the control of personal fortune by guessing the secret of its source; more directly to read the signs of qualities and fate in the appearances of nature and of the human form. Primitive thinking looks upon the universe of things and events—the movements of nature, the sky and land and sea and all that they contain—as a setting for human fate, and looks upon the forces in operation as acting after the manner of human motives. The insight into nature is so uncertain and perplexed, that only some fortunate penetration of the mystery can avail. Weak analogies are accepted, and the body of tradition based upon them is carried forward in a cult of mystic practices. J.J.

**Related Subjects.** The following articles, if they do not all deal with pseudo-sciences, strictly so called, at least treat of closely-related topics:

| | |
|---|---|
| Alchemy | Occult |
| Astrology | Palmistry |
| Clairvoyance | Phrenology |
| Conjuring | Physiognomy |
| Demonology | Psychical Research |
| Divination | Psycho-Analysis |
| Faith Cure | Spiritualism |
| Hypnotism | Suggestion |
| Magic | Superstition |
| Medium | Telepathy |
| Mesmerism | Theosophy |
| Mind Reading | Trance |
| Necromancy | Witchcraft |

**SCILLY ISLANDS,** *sil'ly,* a group of islands belonging to Great Britain, about thirty miles from Land's End, on the coast of Cornwall, England. They are about 140 in number, of which only six are of any importance, namely, Saint Mary, Saint Agnes, Saint Martin, Tresco, Bigher and Sampson. The capital is Hugh Town, on Saint Mary. The group of those inhabited has an area of 4,041 acres and a population of about 2,100. On the islands are found many remains of Druid circles and barrows, and on the Isle of Sampson was found a perfect "Kistvaen," or sepulchral chamber of stone.

The islands are wild and picturesque, with bold and rugged cliffs facing the Atlantic Ocean. The climate is extremely mild, and flowers that cannot be grown anywhere in England are produced in great profusion. The inhabitants are chiefly engaged in fishing, flower growing and agriculture. Vast quantities of narcissus, jonquils and other flowers are sent to the London markets early in spring, and the first new potatoes to be obtained in England usually are sent from the Scilly Islands.

**SCIO,** *si'o,* the ancient CHIOS, an island in the Mediterranean Sea about fifty miles west of Smyrna, in Asia Minor, and belonging to Turkey. It covers an area of 400 square miles and has a mountainous surface, the formation being principally chalky limestone. The climate is delightful and the soil fertile, producing grapes, oranges, lemons and almonds in great abundance.

In 1881 the island suffered from the effects of a terrible earthquake, previous to which it had been one of the richest and most productive islands in the Mediterranean Sea. The chief exports are leather, distilled spirits, fruits, cheese, silk, wool, salt, cattle and wine; the latter has been famous for centuries. The capital is Chios, which had a most important place in ancient history. The island was captured by the Turks in 1566 and was given to the sultana, under whose protection it flourished for a considerable time. Chios by some is supposed to be the birthplace of Homer.

**SCIOTO RIVER,** *si o'toh,* a river draining the central part of the state of Ohio. It rises in Auglaize County, flows eastward and then turns southward, emptying into the Ohio River at Portsmouth. Its most important tributaries are the Little Scioto and Brush Creek; the largest cities along its shores are Columbus, Chillicothe, Circleville and Portsmouth. The Scioto is about 225 miles long and is navigable for 130 miles. It is also a feeder for the Ohio and Erie Canal, which runs nearly parallel with it from Cleveland to Portsmouth. The river is used as a commercial route for the transportation of coal, iron, cement, oil and agricultural products; the whole tributary region is one of fertility and mineral wealth.

**SCIPIO,** *sip'i o,* the name of an aristocratic Roman family, two members of which achieved distinction in the wars against Carthage.

**Publius Cornelius Scipio** (237 B.C.-185 B.C.), called AFRICANUS MAJOR, is regarded as the greatest Roman general before Julius Caesar. He came into prominence when Rome was fighting the army of the great Carthaginian leader, Hannibal, in the Second Punic War. In 205 B.C. he was elected to the consulship and a year later invaded Africa with a large army. At Zama, in the year 202, he inflicted a decisive defeat on the Carthaginians, and brought the war to a close. Scipio returned to Rome a popular hero, was accorded a triumph and received the surname *Africanus.* (*Major,* meaning *elder,* was added to distinguish him from a younger member of the family [see below] who also won the surname *Africanus.*) Towards the close of his life Scipio became involved in a political conspiracy, but on the day set for the trial he delivered an eloquent speech in which he reminded the people of the victory at Zama, of which that day was the anniversary. This stopped further proceedings against him, and he then retired to his country seat in Campania, where he died.

**Publius Cornelius Scipio Aemilianus I** (185 B.C.-129 B.C.), surnamed AFRICANUS MINOR (the Younger), was a grandson of the Elder Scipio by adoption. During the memorable siege of Carthage, the surrender of which ended the Third Punic War, he was elected to the consulship and given supreme command of the army in Africa. On the fall of the city, in 146 B.C., he returned to Rome, where he later held the office of censor. In 134 B.C., having been reëlected consul, he reduced the city of Numantia, in Spain, after the conquest of the Numantines had been attempted in vain by several consuls. Thereafter he devoted himself to political affairs, being one of the leaders of the aristocratic party. Scipio was the brother-in-law of Tiberius Gracchus. He was a man of culture and refinement and a loyal patriot.

**Related Subjects.** The following articles in these volumes will make clear the references in the above discussion:

| | |
|---|---|
| Carthage | Gracchus |
| Censors | Hannibal |
| Consul, subhead *The Roman Consul* | Punic Wars |

**SCISSORBILL,** *siz'er bill,* or **SKIM'MER,** a bird of the Atlantic region, related to the gulls and terns, having a thin, bladelike bill with the lower mandible much longer than the upper. The bird obtains its food by skimming rapidly along the surface of the water with its beak opened wide and the lower mandible thrust below the surface, thus scooping up insects, small fish, shrimps, etc. Its wings are short, and in flying the body is held at an angle to keep them from touching the water. The plumage is black above, with a good deal of white tipping the feathers, and is pure white underneath. The nest is a depression in the sand, and the eggs, three or four in number, are white or buffy white in color, heavily blotched with chocolate.

**SCORPIO,** *skawr'pi o,* THE SCORPION, one of the signs of the zodiac, a constellation considered by astrologers to exercise a most harmful influence on human destinies. According to Greek mythology, the scorpion killed Orion; the latter boasted that he would kill every poisonous reptile on earth, so Diana sent the scorpion to sting him, and he died. The scorpion also frightened the horses of the sun when Phaethon, the son of Helios, endeavored to drive them, causing the incautious driver to be thrown out of the chariot and killed by Jupiter in vengeance for having driven the sun too near to the earth.

Antares, the brightest star in the constellation, is of the first magnitude, with a companion of the seventh magnitude. Aries is the second sign of the zodiac. The name of this beautiful star, Antares, shining with a deep red light, shows that it is anti-Aries, meaning opposed to or opposite Aries. In this constellation, according to Ptolemy, there are twenty-four stars. Scorpio and Orion both appear in the heavens as bright constellations. Scorpio is easily recognized. It looks much like a boy's kite, with a very long tail.

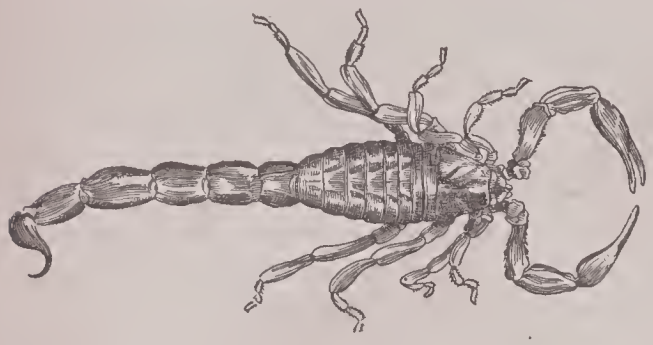
**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Aries | Orion |
| Astronomy, page 444 | Zodiac |

**SCORPION,** *skawr'pi un,* a group of animals belonging to the same class as the spiders, mites and ticks (see ARACHNIDA), found in warm countries in most parts of the world. In the United States, in which Nebraska is the northern limit of their range, there are about twenty species. A scorpion is dreaded by man because of its poisonous sting, dealt from a curving organ on the last segment of the tail. Two glands at the base of the segment secrete a poisonous fluid that flows out of two pores, and the wound inflicted by the animal is exceedingly painful, though not usually fatal.

The poison should be sucked or squeezed out of a wound, and the spot should be bathed with ammonia.

The body of a scorpion consists of two divisions—a short, forward part, made up of the head and thorax, which are united; and a long abdomen, the last five segments of which form a slender tail. On the front end of the body, called the *cephalothorax,* there are two pairs of appendages bearing pincers, and four pairs of legs; the pincers of the second pair of appendages resemble the claws of a lobster. The number of eyes varies on different species from



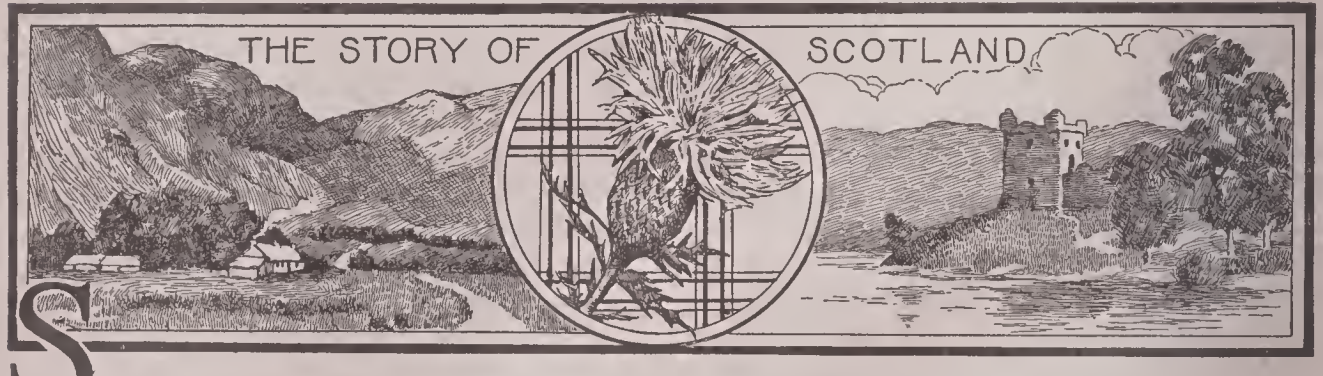
THE SCORPION

six to twelve. On the abdomen are found the breathing pores. Young scorpions stay with the mother for several days after birth, clinging to her body with their tiny pincers. Scorpions feed on large insects and spiders, and are chiefly active at night. They are usually black or yellowish in color.

Consult Comstock's *Manual for the Study of Insects.*

**SCORPION FLY,** a family of insects bearing a general resemblance to scorpions, to which fact the name is due. They belong to the order *Mecoptera,* the name of which means *long-winged.* These insects are from one-half to three-quarters of an inch in length and have two pairs of netted wings as long as the body. The body of the male ends in two slender, pincerlike appendages, somewhat like a scorpion's sting. These pincers can be used as forceps for clasping objects, but they are not a stinging organ such as the scorpion possesses. The life history and habits of the scorpion flies are not well understood, but they are believed to feed on dead animal matter and to lay eggs in crevices in the ground. The larvae, which resemble caterpillars, hatch in about a week and grow rapidly.

**SCOTCH TER'RIER,** a breed of dogs originating in the Scotch Highlands. The standard Scotch terrier is a small animal weighing from eighteen to twenty pounds, with a rough, coarse coat, large, upright ears, pointed nose, and tail carried sharply erect. The hair is dense and wiry, and in color is gray, black, grizzly or sandy. These terriers are alert and active, and are useful in catching mice and other pests. Their intelligence and affectionate ways make them interesting household pets.




**SCOTLAND,** a political division of the United Kingdom, occupying the rugged, northern part of the island of Great Britain, and including the Hebrides, Orkney, Shetland and other islands. This country was called *Caledonia* by the Romans, and later received the name of Scotland from the Scots, a tribe from Ireland, for that country anciently was known as Scotia. The stern and wild beauty of this—

"Land of brown heather and shaggy wood,
Land of the mountain and the flood,"

its warring clans and its hardy heroes, have been celebrated in legend, poetry and song.

**Size and Location.** Scotland is separated from England by the Solway Firth, Cheviot Hills and the River Tweed, and on all other sides is bounded by arms of the sea. Having an area of 30,404 square miles, it is about as large as the state of South Carolina, or as New Brunswick and Prince Edward Island combined.

**The People.** A rugged land, vigorous climate and lack of great wealth have developed the hardy Scotchman. The brawny Highlanders, the tallest people in the world, averaging from five feet eight inches to six feet in height, and

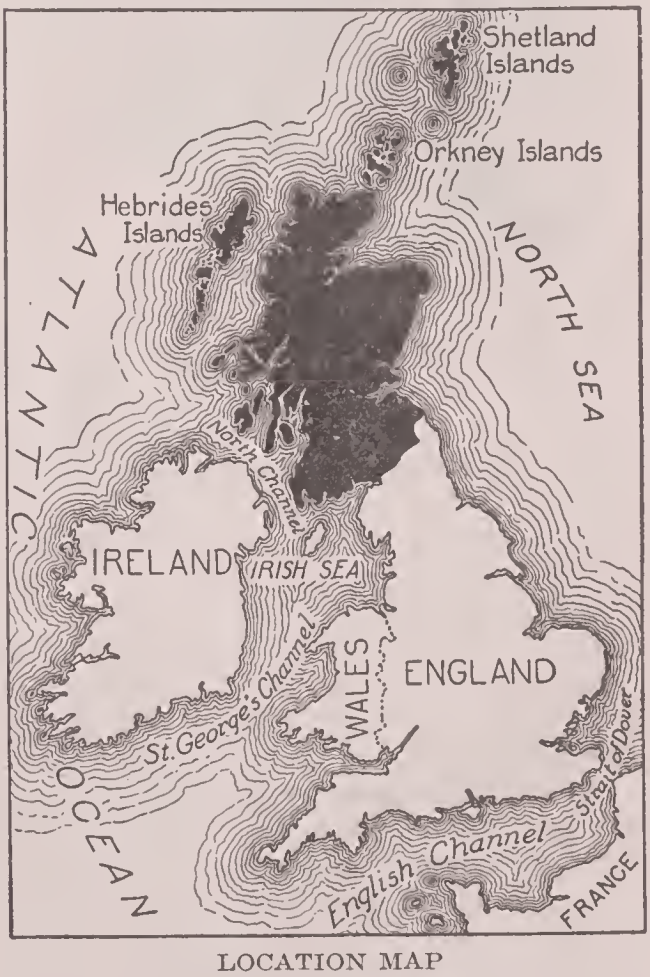
their thrifty brothers of the Lowlands, inherit from their warring ancestors their loyalty to country and clan, their frugality and their energy. Although the Scotch are a practical and sober people, their history is full of romantic and heroic legend. The national dress of bright plaid kilts is still worn by the Highland troops, and town and countryside still echo to the noisy, strange music of the bagpipe, which long ago replaced the harp of the ancient bards. Bands of Highland troops in their kilts performed some of the most daring feats in the War of the Nations, and a regiment of Scotch-Canadians won from their German opponents the name "Ladies of Hell." The clan or tribe, which in no other European country has played so conspicuous a part in history, is still important in the social life.

Over one-tenth of the people of the United Kingdom live in Scotland. The population, which was 4,760,904 in 1911, is about equal to that of the state of Ohio, and exceeds that of either Quebec or Ontario, the largest Canadian provinces. In the Highland districts the population is scattered, but the Lowland region near the great cities of Glasgow and Edinburgh is one of the most thickly inhabited districts of Great Britain. Almost the entire population is native Scotch; only seven per cent are of Irish and English birth, and less than one per cent are foreigners. The townward movement among the rural inhabitants is increasing, and over three-fourths of the people are inhabitants of burghs and cities, the largest of which are Glasgow, having 784,496 inhabitants, Edinburgh, a little less than half its size, and Dundee and Aberdeen, each having a population of over 160,000. The agricultural communities, especially, have suffered from the large emigration to the United States and to distant British colonies, principally Canada, "the Scotland of America."

**Religion.** Scotland is the home and stronghold of Presbyterianism, and most of the inhabitants are members of the established United Free Church of Scotland. Two other denominations, the Episcopal and Roman Catholic bodies, are increasing in numbers, but are still comparatively unimportant.

**Language and Literature.** Although the ancient Scottish vernacular may still be heard in many communities, and there are various dialects in different localities, the modern language of Scotland is English. Until the fifteenth century, a distinct Scotch, or Gaelic, tongue was spoken in the Highlands, but the dialect of the Lowlands was much like that of Northern England. This Gaelic tongue, affected by the Latin and French influence of the fifteenth and sixteenth centuries, remained the national language of the Highlanders until the union with England.

Until the eighteenth century Scotland had a distinct national literature. The ballads and songs of the bards, the romance of *Sir Tristram* by Thomas the Rhymer, the tales of *The Bruce* by Barbour and stories of the deeds of Wallace by "Blind Harry" exerted a great and lasting influence on the work of the later poets of both Scotland and England. James I, Dunbar, Douglas and Lyndsay are prominent Scottish poets of the fifteenth and sixteenth centuries. The later writers of Scotch birth, in-

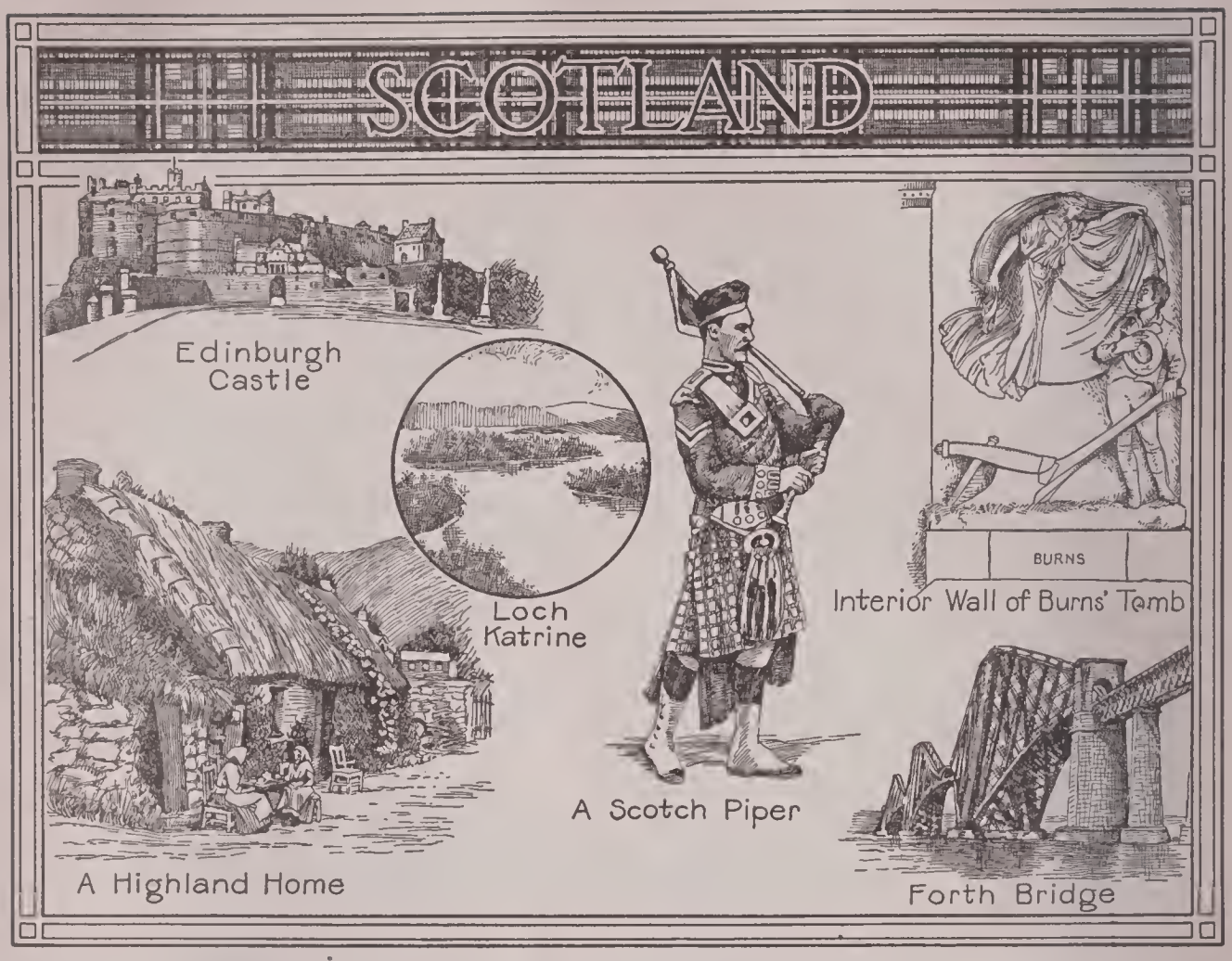



LOCATION MAP

Showing the relative sizes of the divisions of the British Isles.

cluding Robert Burns, Sir Walter Scott, James Hogg, Joanna Baillie, George Macdonald, Robert Louis Stevenson, John Watson (Ian Maclaren) and James M. Barrie, are discussed in the history of English literature, and most of them are noted in these volumes under their separate titles.

**Education.** Scotland surpasses all other parts of the United Kingdom in the excellence of its elementary and secondary educational sys-




tems. The many religious and civil struggles of the country did not prevent the early provision for public instruction. In 1872 the Scottish Educational Department was created, and boards having charge of elementary and secondary schools were elected in every burgh and parish. These boards may impose religious instruction, but children are not compelled to receive such instruction. Since 1891 instruction has been free to all between the ages of three and fifteen years and compulsory between the ages of five and fourteen. Parish schools are chiefly elementary, secondary education being given in academies and burgh schools. Unlike England, Scotland has never had many private boarding schools.

The growth of technical education in recent years has been remarkable. In every important town technical schools have been established, and instruction is also provided in rural districts. The Royal Technical College at Glasgow, the largest institution of its kind in the British Empire, and among the most important in the world, is the center of technical education.

In higher education, too, Scotland is in advance of England, having more universities and a much larger attendance in proportion to the population. Women are admitted on the same conditions as men, and university education may be had at much less expense than in England. The universities are aided by the government and by an annual income of $2,500,000 from the gifts of Andrew Carnegie. The prominent universities are Saint Andrews, founded in 1411; Glasgow, 1450; Aberdeen, 1496; and Edinburgh, 1582.

**The Land.** The Northern Highlands, occupying one-third of Scotland, are a region of parallel, craggy ridges extending from northeast to southwest. They are furrowed and trenched by deep glens, through which flow rapid torrents and cataracts and in which lie deep mountain lakes. The rugged mountain crests form natural battlements and turrets. Their precipitous slopes are roughened by bosses and corries, or caldronlike hollows scooped out by the streams. Their deep ravines are dark with dense woods of pine and birch. Many of the summits of the Eastern Highlands are broad, undulating moors, and it is said that in this region there is more level land on the mountain summits than in the valleys. As one journeys westward, the peaks become higher and

more craggy. The Grampian Hills in the west, the loftiest mountains of Scotland, are separated from the Northern Highlands by Glenmore, a deep glen which stretches across the country from sea to sea. Here Ben Nevis, the highest mountain of Great Britain, rises to an elevation of 4,406 feet. The deep glens, craggy peaks, lovely moors and beautiful lakes, echoing to the din of Highland battle, have become famous through Scott's *Lay of the Last Minstrel, Marmion* and the *Lady of the Lake.* The central plain, a region of grassy slopes and dells, rippling brooks and wooded hills, lies between the Highlands and the Southern Uplands (see below). It resembles the rolling fields of England, and is the richest mineral and agricultural region of Scotland.

Rising abruptly to the south are the Uplands, a rolling table-land of grassy moors, broken by low, verdant mountains and a few bare precipices. The grassy heights furnish pastureland for large flocks of sheep, and in the valleys grains and other crops are grown. To the Uplands belong the Cheviot Hills, famous in border warfare.

The land is penetrated by many inlets, or sea *lochs,* and few places are more than forty miles from the sea. Because of the remarkable irregularity of the coast line, Scotland, though smaller than England, has more miles of seacoast. On the west the cliffs rise from the sea in a great rock wall, in some places projecting in rough piers and buttresses, in others, cut by deep, narrow fiords resembling those of Norway. Tall pillars of rock, called *stacks,* are often left standing alone amidst the waves, and are the lonely habitation of myriads of sea birds. Numerous islands border this western coast, including the Hebrides and the Isle of Skye. The largest of the sea lochs penetrating the west shore are the firths of Lorne and Clyde.

On the east coast, the Firth of Forth and Moray Firth extend far inland. These inlets and the Firth of Tay are bordered by low, sloping beaches, but in the south the Uplands plunge boldly to the sea, and a few rocky cliffs rise between the sandy beaches to the north. Caithness, in the extreme northeast, meets the sea in a broad, level moor. The rocky Orkney and Shetland islands are the only groups off the north coast.

**Rivers and Lakes.** The most important commercial river of Scotland is the Clyde, upon which Glasgow is situated. This river flows into the wide Firth of Clyde, an inlet of the Atlantic Ocean, but the other large rivers of Scotland flow east to the North Sea. Among these are the Tay, which has a greater volume than any other river of the British Isles, the Tweed, Forth, South Esk, Don, Dee, Spey and Findhorn. Among several small rivers of the west coast are the Ayr and the Doon. The Nith flows into Solway Firth, an inlet of the Irish Sea.

The Highland streams rush through deep, narrow gorges, and over rocky ledges in foaming cataracts. In the central and southern regions the rivers are bordered by high, grassy banks and braes.

The central and western portions of the country are studded with a multitude of beautiful lakes, ranging in size from picturesque Loch Lomond to the numerous small rock *tarns* nestling in the western mountains. Among these lakes, noted for their beautiful scenery, are the lonely and wild Loch Skene of the Southern Uplands, the Lowland Lake of Menteith, and Loch Katrine, of which Scott says:

> Where, gleaming with the setting sun,
> One burnished sheet of living gold,
> Loch Katrine lay beneath him rolled;
> In all her length far winding lay,
> With promontory, creek, and bay,
> And islands that, empurpled bright,
> Floated amid the livelier light,
> And mountains, that like giants stand,
> To sentinel enchanted land.

**Climate.** Owing to the warm waters of the Gulf Stream, which washes the west shores of the British Isles, the west coast of Scotland is milder in winter and cooler in summer than the east coast. The North Sea has a moderating influence upon the climate of the eastern shore, but in a much smaller degree. Summers are cool throughout Scotland, and winters are cold, especially in the inland districts, where the mountains and uplands are covered with snow three months of the year. Much of the moisture of the prevailing Atlantic winds falls on the Western Highlands, where the annual precipitation exceeds 100 inches and on the summit of Ben Nevis reaches 150 inches. The eastern section is comparatively dry, especially in those districts protected by the highest western mountains, as in Tweedale, East Lothian and the lowlands of Moray Firth, where the annual rainfall averages but twenty-six inches.

**Agriculture.** Less than one-sixth of this mountainous country is arable land, and this is confined chiefly to the Lowland districts. The farm lands, as in England, are parts of large estates and are rented to farmers whose fami-

lies have usually held the same land for generations. This system has been a severe handicap to the capable Scotch, but when the present leases expire, the Smallholders' Act of 1911 will break up this historic land system. By this act, the farmers with small capital may obtain a holding of fifty acres, and the large, private tracts, reserved as deer forests, will be opened to cultivation.

Although farming is not pursued upon an extensive scale, intensive cultivation of available land produces large yields of cereals and vegetables. Oats, the chief food of the Scotch farmer, are by far the most important crop. Turnips, another stock food, potatoes, barley and hay are raised in large quantities. Orchard and small fruits are cultivated especially in Clydesdale, and market gardening is important near the large cities.

The grass-clad moors of the Uplands and Highlands, covering almost one-half of the total area of Scotland, are used for grazing, and stock raising is an important industry. Fine breeds of cattle, such as the Jersey, Ayrshire, Galloway and Polled Angus, are native to the Scottish Highlands. The Cheviot Hills and Highlands are famous for their sheep, the number of which is over six times that of the cattle raised. The Clydesdale draft horses and the Shetland pony are also famous Scotch stock.

**Fisheries.** The replacement of sailing crafts by steam trawlers and motor vessels in the fishing industry is forcing out the poor, private fisherman, who is not able to compete with the well-equipped boats owned by large companies. Owing to the proximity of all parts of Scotland to the sea and to the numerous sheltered fiords, lochs and wide-mouthed rivers, as well as inland lakes and streams, fishing has been one of the important sources of livelihood of many of the inhabitants. The salmon, whale and seal fisheries are now chiefly controlled by large companies, and many Dutch and Norwegian vessels fish in Scottish waters. The most important catches are cod, herring and haddock. Aberdeen is the center of the fishing industry. The Fisheries Board of Scotland regulates the industry.

**Mining.** The large fields of coal and iron in the central plain of Scotland are the foundation of the national industry. Great quantities of coal are mined in Fife and Lanark counties, in the latter of which Glasgow is situated. Ayr and Renfrew counties produce much of the iron product. From Linlithgow County are taken millions of tons of shale, which yields great quantities of shale oil. An increasing demand for this oil is assured by the substitution of liquid fuel in place of coal in the British navy. Granite, limestone, slate, fire clay and lead are of importance. The total annual value of the mineral product of the country exceeds $112,182,000.

**Manufactures.** In the eighteenth century Scotland's industrial interests superseded agricultural activities, and over one-fourth of the population are now engaged in manufacturing and the coal and iron industries, a proportion which is exceeded in few countries. The iron production and maritime advantages of the country have developed the largest shipyards of the world along the Firth of Clyde, and made great shipbuilding centers of Leith, Aberdeen, Grangemouth and Dundee. The great vessels of the Cunard Line and famous yachts are built in the Clyde yards, which were an important center of construction in the War of the Nations, and noted merchant clippers are constructed in the yards of the east coast.

As in England, the textile industry shows a slight decline, but it is still one of the chief manufacturing industries. Scotch yarns and woolens, including tartans, plaids and shawls, especially those manufactured in the district of the Tweed, are famous for their excellence. Linens and cottons are also extensively manufactured, the latter especially in the vicinity of Glasgow, and lace weaving and the manufacture of silk are increasing in importance.

Glasgow is also the center of the large iron and steel industry. Scotland produces about one-seventh of the pig iron of the United Kingdom. Whisky distilleries are widely scattered throughout the country. As a publishing center, Edinburgh has been famous since the sixteenth century. Glasgow has important chemical industries, and the manufacture of paper, glass, gloves and hosiery is also carried on.

**Transportation and Commerce.** There are over 3,800 miles of steam railroad in Scotland, and there is a complete tramway system connecting the important industrial centers of the Lowlands. The improvement of Scottish highways has been regulated by law since the twelfth century, and the roads are kept in repair by annual government grants. There has been much improvement in water transportation. The Caledonian Canal, between Moray Firth and Loch Linnhe, extends navigation across the country in the north-central section, and the Forth and Clyde Canal opens a waterway from sea to sea, passing Glasgow. The Union

Canal extends from the Clyde Canal to Edinburgh, and the Crinan from Loch Gilp to Jura Sound. Leith, Dundee, Grangemouth and Aberdeen are the large ports of the east coast, and Glasgow, Greenock and Kilmarnock are the important commercial ports of the Firth of Clyde, on the west.

As in the other divisions of the British Isles, the coasting, foreign and colonial trade is large. Great quantities of coal are exported from Glasgow and ports on the Firth of Forth, and iron and textiles are also sent out. Many of Scotland's imports are brought into the country by rail through England, and as a result the value of goods entering Scottish ports is less than one-eleventh of that brought into English ports.

**Local Government.** (For *Central Government* see GREAT BRITAIN.) In 1894 the Local Government Board for Scotland was created, consisting of the Secretary for Scotland, the Governor-General, the Undersecretary and three other members appointed by the Crown. The counties and parishes are administered by councils similar to those in England. Burghs or towns are governed by municipal boards, provosts and bailies. There are five kinds of chartered burghs, burghs of barony and regality, and royal, parliamentary and police burghs. In the first two, which are practically the same, there are no councils. Representatives from the royal and parliamentary burghs, which have statutory constitutions, meet together for the transaction of business. The police commissioners are the local authorities in the police burghs, and these towns may also send representatives to the convention. According to Scotch usage "police" includes drainage, paving, lighting conditions, etc.

*Judicial Department.* The supreme civil court is the Court of Session. The Court of Justiciary, composed of judges of the Court of Session, is the highest authority in criminal cases. The inferior courts are sheriff courts, justices of the peace, bailie, dean of guild and police courts.

## *History of Scotland*

**Early Inhabitants.** At the time of the Roman invasion of the British Isles, 78-82 A. D., Caledonia, or that region north of the Forth and Clyde Rivers, was occupied by a composite race, descendants of the Celtic invaders and a non-Aryan people, the original inhabitants of the country. These Caledonians were later called Picts and were the ruling people of North Britain when it was invaded by the Scots from Ireland. The Teuton Britons invaded the south and Lowland regions, and Scotland's early history is a story of the continual warfare between the Picts of the Northern Highlands, the Scots and the heathen Teutonic invaders. The Scots were Christians before their invasion of Caledonia, and the Picts were converted by Saint Columba, the Celtic missionary from Ireland.

**Establishment of the Kingdom of Scotland.** In the ninth century the Picts and Scots were united under Kenneth MacAlpin, king of the Scots, and a hundred years later this kingdom became known as Scotland. Until the eleventh century, the country was chiefly occupied in wars with the Norsemen, who had settled in the Orkney and Shetland islands, and with the English in the south. Revolts and intrigues against the king were frequent among the *mormaors,* the rulers of the various Scottish provinces, and the *toisechs,* or tribal chieftains. The purely Celtic monarchy ended with the accession of Malcolm Canmore (1058), after the death of Macbeth. Malcolm strengthened the growing English influence in Scotland by his support of the English king against the Norman invaders, but he, at length, was forced to submit to William the Conqueror and do homage for his kingdom.

The feudal system in Church and State spread over Scotland in the twelfth century. David I (1124-1153), called the "Maker of Scotland," reformed justice, established towns and bishoprics, replaced Scotch lords and churchmen by English and Norman nobles and acquired Northumberland by conquest. In 1175 the Scottish king, William the Lion, was captured in an invasion of England, and for the next fourteen years Scotland was a feudal dependency of England. William's son, Alexander II, renounced his claim to the northeastern provinces of England for a yearly payment of about $1,000, but his successor, Alexander III, recovered the western islands from the Norsemen by treaty in 1266.

**The Struggle for Independence (1286-1328).** Although the English kings claimed an overlordship over Scottish rulers, the latter, except William the Lion, paid homage for their English possessions only. After the death of Alexander III, there were thirteen claimants to the

throne, and Edward I of England claimed the right as overlord to appoint the successor. The Scottish nobles revolted against his choice of John Baliol and formed an alliance with France. Edward then invaded Scotland and as a result of his victory at the Battle of Dunbar declared himself king. The native Scots rallied under William Wallace, the popular hero of Scottish history, and defeated the English forces at Stirling. The long and cruel wars of independence which followed ended in the victory of the Scotch under Robert Bruce in the famous Battle of Bannockburn in 1314, one of the decisive battles of the world's history.

**Power of the Nobility.** Bruce was crowned king, but the struggles with rival claimants to the throne were not ended. During the reign of his son, the child king, David II (1329-1371), a descendant of John Baliol, supported by Edward III of England, claimed the throne. Added to the perpetual warfare on the English border were the feuds between the powerful clans and the long struggle between the house of Douglas and the Crown. During the reigns of David and his successors, Robert II and Robert III, the powerful nobles were virtually the rulers of Scotland. Robert II was the first of the Stuart dynasty.

Order was restored and the nobles subdued by James I (1406-1437), and the Scotch-French alliance was renewed. However, during the succeeding reigns of James II and James III, history repeated itself in the renewal of feud, murder and anarchy. James IV, through his alliance with France, then at war with England, invaded Northumberland and was defeated and killed at Flodden Field in 1513. James V and his daughter, Mary, Queen of Scots, continued the alliance with France, and this and their Catholic faith made them unpopular in Scotland. The romantic and tragic life of Mary Stuart is given in detail under the heading MARY STUART. During most of her reign the court of Scotland was the center of plot and intrigue.

**Religious Struggles.** The religious Reformation in England spread to Scotland and reached its height in 1559 and 1560, under the leadership of John Knox. In 1560 a Reform Party Parliament assembled and established the democratic Presbyterian Church.

The religious struggles and plots of intriguing ministers continued during the reign of Mary's son, James VI. In 1603 he left Scotland to become James I of England, and from this time Scotch history is closely related to that of England (which see). Both James and his son, Charles I, attempted to draw the two countries into closer union and to establish the Church of England in Scotland, thus adding to their unpopularity among the Scotch Covenanters.

In the Civil War in England, 1642-1649, when Cromwell's Parliament Party defeated the Royalists and executed Charles I, the Covenanters took the part of Parliament. After the Restoration, in 1660, Charles II attempted to reëstablish Episcopacy in Scotland, and the strict Covenanters were cruelly persecuted. They joined the English Revolution of 1688 and proclaimed William and Mary as their sovereigns. Religious freedom was restored, but during the following reign of Queen Anne, the ill feeling between Scotland and England increased, and England saw that a union was necessary to preserve peace.

**Union with England.** Not without violent opposition in the Scottish Parliament, the Articles of Union were passed in January, 1707, and the two kingdoms were united under the name of Great Britain. It was provided that the Presbyterian Church of Scotland be maintained; that sixteen Scottish lords and forty-five members of the House of Commons be elected to the Parliament at London; that all rights of trade and citizenship be the same for Scotch and English subjects; that Scottish property laws, customs and private rights remain unchanged. Henceforth the history of Scotland is part of that of Great Britain.

Scotland has, without doubt, benefited from the union with England and has never made any aggressive attempt to reëstablish "Home Rule." However, in recent years there has been a revival of national feeling which has been reflected in the renewed interest in Scottish customs, language and literature. There is also widespread feeling that the Scottish department of government should be situated in Edinburgh, rather than in London. The Scottish troops distinguished themselves for their loyalty and gallant action throughout the War of the Nations, winning special recognition for their conspicuous bravery in the Battle of Loos, in the second attack at Ypres, at Longueval and at Messines. E.B.P.

Consult Lang's *Short History of Scotland;* Brown's *History of Scotland to the Present Time:* Oliphant's *History of Scotland for the Young.*

**Related Subjects.** The reader who is interested in Scotland will find much information in the following articles in these volumes:

# *OUTLINE AND QUESTIONS ON SCOTLAND*

## *Outline*

**I. Location**

(1) Latitude, 54° 38′ to 58° 41′ north
(2) Longitude, 1° 45′ 32″ to 6° 14′ west
(3) Relation to England
(4) Islands

**II. Size**

(1) Actual, 30,404 square miles
(2) Comparative

**III. Surface and Drainage**

(1) Northern Highlands
  (a) Grampian Hills
(2) Central plain
(3) Southern Uplands
(4) Broken coast line
(5) Rivers
(6) Lakes
(7) Scenic features

**IV. Climate**

(1) Influence of Gulf Stream
(2) Unequal distribution of rainfall

**V. Industries and Resources**

(1) Agriculture
  (a) Only one-sixth of land arable
  (b) Land system
  (c) Chief crops
(2) Stock raising
(3) Fisheries
(4) Minerals
  (a) Coal and iron
  (b) Other yields
(5) Manufacturing

**VI. Transportation and Commerce**

(1) Steam railways
(2) Tramways
(3) Water transportation
(4) Coastwise and foreign trade

**VII. The People**

(1) Physical characteristics
(2) Customs
(3) Distribution of population
(4) Education
(5) Religion
(6) Language and literature

**VIII. Government and History**

(1) Central government
(2) Local government
(3) History
  (a) "Caledonia"
  (b) The coming of the conquerors
  (c) Establishment of kingdom and struggle for independence
  (d) The Stuart kings
  (e) Era of religious struggles
  (f) Union with England

## *Questions*

How does Scotland's largest river rank among the rivers of the British Isles as to volume?

What king figured in one of the most famous dramas ever written? Tell his story.

What and where are the *stacks,* and what form of life is to be found on them?

What island gave to Scotland its name and its Christianity?

How does the country compare in number of inhabitants with the American state and the Canadian provinces which it most closely resembles in size?

Who were the "Ladies of Hell," and why were they so called?

Name four writers whose works make up an important part of English literature, but who really belong to Scotland.

What and where is the loftiest peak in Great Britain? How high is it?

What part have the Cheviot Hills played in history and in literature?

Why has the western coast of Scotland a more temperate climate than the eastern coast?

What industry has been affected by the change in fuel in the British navy?

Who is the "popular hero of Scotland history," and what did he accomplish?

CITIES AND TOWNS

| | |
|---|---|
| Aberdeen | Edinburgh |
| Ayr | Glasgow |
| Bannockburn | Gretna Green |
| Dundee | Leith |
| Dunfermline | Paisley |

HILLS

| | |
|---|---|
| Ben Nevis | Grampian |
| Cheviot | |

HISTORY

| | |
|---|---|
| Baliol, John De | James I (England) |
| Bannockburn | Knox, John |
| Bruce, Robert | Macbeth |
| Caledonia | Mary Stuart |
| Edward I, II and III (England) | Picts |
| England, subtitle *History of England* | Presbyterians |
| Great Britain, subtitle *History of Great Britain* | Wallace, William |

ISLANDS

| | |
|---|---|
| Hebrides | Shetland |
| Orkney | |

LAKES

| | |
|---|---|
| Katrine | Lomond |

LEADING PRODUCTS

| | |
|---|---|
| Cattle | Oats |
| Coal | Shale |
| Cod | Sheep |
| Fish | Ship |
| Iron | Steel |

RIVERS

| | |
|---|---|
| Clyde | Solway Firth |
| Forth | Tay |

**SCOTT,** Duncan Campbell (1862- ), a Canadian poet and historical writer, one of the best known of contemporary Canadian men of letters. Scott was born at Ottawa, where he attended the public schools. Later he went to Stanstead Wesleyan College. In 1879 he entered the Dominion civil service as a clerk in the department of Indians, in which he was steadily promoted until, in 1914, he became deputy superintendent-general of the department. Scott's first volume of verses, *The Magic House,* appeared in 1893, and was followed at irregular intervals by *Labour and the Angel, New World Lyrics and Ballads, Lundy's Lane and Other Poems* and *Via Borealis. The Village of Viger* is a collection of ten short stories. Scott was one of the editors of *The Makers of Canada,* a series of historical biographies, and himself wrote the life of John Graves Simcoe in that series. Many of his poems and prose writings have appeared in Canadian and American periodicals.

**SCOTT,** Frederick George (1861- ), a Canadian churchman and poet, best known for the volumes of verses called *The Hymn of Empire* and *My Lattice and Other Poems.* One of his latest works is a collection of poems, entitled *The Crown of Empire,* which were written at the front in the War of the Nations. Scott was at the front as senior chaplain of the first Canadian division, British Expeditionary Force (B. E. F.).

Scott was born at Montreal, attended the local high school, and later was graduated from Bishop's College, Lennoxville, and King's College, London. He was ordained deacon in 1884 and priest in 1886, in the latter year becoming curate of a small parish in Essex, England. In 1887 he was chosen rector at Drummondville, Quebec. After three years as curate of Saint Matthew's, at Quebec, he became rector in 1899. Scott's first published volume of verses was entitled *The Soul's Quest and Other Poems* (1888). Among his other works, in addition to the volumes already mentioned, are *Elton Hazlewood,* a story; *The Unnamed Lake, The Key of Life, Poems,* and various short stories.

**SCOTT,** Hugh Lenox (1853- ), an American military officer who succeeded to the position of chief-of-staff of the United States army in 1914. He was born at Danville, Ky., and was educated at West Point, from which he was graduated in 1876. For several years thereafter he served in expeditions against the Indians. From the close of the Spanish-American War until 1903 Scott acted as adjutant-general of Cuba, and for the next three years was governor of the Sulu Islands (in the Philippines). From 1906 to 1910, having attained the rank of colonel, he acted as superintendent and commandant at West Point. In 1913 he was made brigadier-general and placed in command of a brigade of cavalry stationed along the Mexican border. He has a special talent for straightening out difficulties by means of diplomacy; in 1915 was successful in pacifying a lawless band of Piutes in Utah, and in 1916 was influential in dealing with the Villa faction in Mexico. In the latter year he was promoted to the rank of major-general. In 1917 he was appointed a member of the American commission to Russia, of which Elihu Root was

HUGH L. SCOTT

the head. General Scott is an ardent advocate of the principle of universal military service. In September, 1917, he reached the age limit for retirement.

**SCOTT,** Sir Richard William (1825-1913), a Canadian statesman, for half a century one of the leaders of the Liberal party. He served in the Ontario legislature, held office in the Mackenzie and the Laurier ministries, and was for thirty years the Liberal leader in the Dominion Senate. Sir Richard was born at Prescott, Ont., and was educated by a private tutor. Called to the Ontario bar in 1848, he soon became a leader in the profession at Ottawa. In 1852 he was elected mayor of that city and from 1857 to 1867 sat in the old Canada assembly. After Confederation he was elected to the first Ontario assembly, in which he sat for six years, being speaker in 1871. From 1872 to 1874 he was commissioner of crown lands for Ontario in the Blake administration.

When Alexander Mackenzie in 1874 formed his Dominion Cabinet, he included Scott as Secretary of State and Registrar-General. In the same year the Earl of Dufferin called Scott to the Senate, in which he spent the balance of his political life. In 1878, when the Liberals were defeated, Scott became leader of the Liberals in the Senate, a position which he did not relinquish until 1908, when he retired from public life. During the last twelve years of that period, 1896-1908, he was again Secretary of State, in the Laurier Ministry. Scott in 1878 carried through Parliament a Dominion Local Option law, generally known as the Scott Act or Scott Temperance Act. He was knighted in 1909.

**SCOTT,** Robert Falcon (1868-1912), a noted English explorer, who lost his life on the return journey from the South Pole, which he had set out to discover, but which had been reached a month earlier by Roald Amundsen. He was born at Outlands, Devonport, was educated at Stubbington House, Fareham, and in 1882 entered the navy. In 1889 he attained the rank of lieutenant, and in 1900 was made commander. In this latter year he undertook his first Antarctic expedition, and on returning, in 1904, was showered with honors. The rank of captain was conferred upon him, and in 1909 that of naval assistant to the second sea lord of the admiralty.

He had become absorbed in plans for Antarctic discovery, and in 1909 resigned from the navy and fitted out another expedition. Late in 1910 Scott sailed in the *Terra Nova* from New Zealand and reached the foot of Mount Erebus, where he had determined to set up his headquarters. During the summer of 1911 he established supply stations along his proposed route toward the Pole, and in November started with sledges over the ice. For part of the journey snowstorms and bad sledging made advance slow and difficult, but the party kept on, and as they neared their goal conditions grew more favorable.

ROBERT F. SCOTT
His name will always be associated with the history of south polar exploration.

On January 18, 1912 they reached the Pole, only to find that Amundsen had been before them in the discovery. Setting out on their return journey, the whole party of five died from privation and exposure. The *Terra Nova,* sent out in 1912 to bring the explorers home, carried back instead the tragic news.

The bodies, together with records and diaries kept by members of the party, were found in the tent which had been erected as their last camping place, and Scott's diary, written up to the day of his death, gave what he considered the causes of the disaster, and closed with an appeal to the public to provide for the families of himself and his companions. It was an appealing account of a tragedy which shocked the whole world. Near the place where he died a memorial has been erected.

Consult *Scott's Last Expedition,* written from his own records.

**Related Subjects.** The reader is referred to the following articles in these volumes:

Amundsen, Roald
Polar Exploration, subtitle *Antarctic Exploration*
Ross, James Clark
Shackleton, Sir Ernest Henry

**SCOTT,** Sir Walter (1771-1832), Scotch novelist and poet, born at Edinburgh, August 15, 1771. His father was a lawyer, a man with little of the adventurous spirit which distinguished the son; but among the ancestors of the family on both sides were border chieftains, tales of whose bold raids and marauding expeditions still lived in the countryside. Young Walter Scott never tired of hearing these accounts—indeed every one with whom he came in contact

was called upon to tell him stories. It was fortunate that he could find enjoyment in this way, for an illness when he was less than two years old left him lame and delicate and unable to play like other boys. He was sent to his grandfather's farm to regain his strength, and spent days listening to the stories his aunt read to him or lying in the fields, watched over by his grandfather's old shepherd. For a boy with an intense interest in all he saw about him, it was very hard to lie still and look at things from a distance, and gradually he began to drag himself about.

Strength came back to him, and by the time he was eight years old he was, except for his lameness, as robust as any of his fellows. Then he was sent to school, but he was behind other boys of his age, and consequently lost interest.

SIR WALTER SCOTT

By their vigor, their freshness, their rapid action, and their breezy, out-of-door atmosphere, Scott's novels attracted thousands of readers who else had known nothing of the delights of literature. He is, therefore, the greatest known factor in establishing and in popularizing that romantic element in prose and poetry which has been for a hundred years the chief characteristic of our literature. —LONG.

His record, therefore, was not always satisfactory, though his teachers admitted that he was unusually quick in comprehension. Like little Charles Dickens, however, he was in great demand among his schoolmates as a story-teller. He took a large part, too, in the sports of the school, and the little sketch which he wrote years later of his boyhood days tells of exciting mock battles which the schoolboys had with the boys of the town. Through it all he kept his fondness for romantic tales and poems, and before he was ten years old began making a collection of books on such subjects. The finding of Percy's *Reliques of Ancient English Poetry* was an epoch in his life and exercised a distinct influence on his literary activity.

**The Practice of Law.** Two years at the University of Edinburgh added nothing to his reputation as a student, though when his interest was once aroused no work was too hard for him. Thus he mastered French, Italian and German, that he might read the romantic literature in those tongues. His father had determined that the son was to follow the legal profession, and though he had no great liking for it, he applied himself with diligence to the work in his father's office and later entered law classes at the University of Edinburgh. In 1792 he was called to the bar. During his days of apprenticeship he took trips about the country, finding especial delight in old battle fields, ruins and other places with historical association. The fact that Scott thus steeped himself in the literature of romance and acquainted himself thoroughly with the historic backgrounds of happenings in his own country accounts in part for the wonderful speed with which he later produced his great works.

Scott's law practice, while never large, was promising enough to warrant him in marrying Charlotte Charpentier, in 1797, and the young couple divided their time between Edinburgh and the suburb of Lasswade. An appointment as sheriff of Selkirkshire in 1799 and as a clerk of the Court of Sessions some years later assured him an income, so that he was able to give up the law and devote himself to literature.

**Beginning of Literary Career.** The first work which appeared under his name was a translation, in 1796, from the German of Bürger's *Lenore* and *The Wild Huntsman,* followed three years later by an English version of Goethe's *Götz von Berlichingen.* Meanwhile, he had tried his hand at poetry, and produced the fine ballads of *Glenfinlas,* the *Eve of Saint John* and *Grey Brother.* For years he had been collecting Scottish border poetry, and the results of his work were published in 1802 and 1803 as *Minstrelsy of the Scottish Border,* which won him wide and favorable notice. In 1805 appeared his first original work of note—the long poem called *The Lay of the Last Minstrel.* Its popularity was immediate and great, and Scott might almost have said, like Byron, that he "woke one morning and found himself fa-

mous." *Marmion* followed, and was even more enthusiastically received; the swinging lines, as one biographer has said, "took possession of the public like a kind of madness;—people could not help spouting them in solitary places and muttering them as they walked about the streets." Scott himself was astonished at his success, which was repeated in 1810 on the publication of *The Lady of the Lake,* which drew crowds of tourists to the scenes it described and raised the post-horse duty in Scotland.

In 1804 Scott removed from Lasswade to the banks of the Tweed, where seven years later he bought a farm of one hundred acres, with an unpretentious cottage. From year to year, as his income warranted, he bought more land, and little by little built up the magnificent castle of Abbotsford, "the romance in stone" which was the pride of the countryside. Not until 1824 was it finished. Scott showed the keenest interest in every phase of its progress and delighted particularly in the library, with its carved oak ceiling and thousands upon thousands of books, and the armory, with its notable collection of weapons.

ABBOTSFORD, THE "ROMANCE IN STONE"

**Abandoned Poetic Form.** Scott had felt that poetry was not for him the only possible mode of expression, and as early as 1806 started *Waverley,* which, however, he laid aside. As he began to realize that the poems which followed the *Lady of the Lake* were diminishing rather than increasing his fame, he determined to return to the prose romance, strengthened in his purpose by the fact that Byron was surpassing him in his own field in poetry. In 1814 *Waverley* appeared anonymously, and the earlier success of the poetry was duplicated. The "Great Unknown" was discussed on all sides, and although before long the secret became an open one, it was not until 1827 that Scott formally acknowledged the authorship. In incredibly rapid succession appeared the volumes in the long series of Waverley Novels, two often appearing in one year. Indeed, even to those who were practically certain that they were from Scott's pen, it seemed impossible that he could produce them, at the same time tending to his official duties, playing the gracious host to the constant stream of visitors at Abbotsford and writing the things which were at this same time appearing under his own name. Among these novels the most noteworthy were perhaps *Guy Mannering, The Heart of Midlothian, The Bride of Lammermoor, Ivanhoe, Kenilworth, Quentin Durward* and *The Talisman,* though to lovers of Scott no one of all the volumes is without its peculiar interest and charm.

**Struggle Against Financial Difficulties.** In 1820 Scott's fortune seemed assured. The sales of his books amounted to at least $50,000 a year, he was sought after by the notable and the wealthy, and he had just been created a baronet. His good fortune, however, was built

on an insecure foundation. Years before he had become a silent partner in the printing firm of James Ballantyne & Company, and more than once he had been called upon to rescue it from misfortune. In 1826 the failure of the great publishing business of Constable & Company brought Scott's firm into bankruptcy, the amount of indebtedness being about $600,000. The Ballantynes withdrew, and the creditors themselves offered compromise; but Scott's sense of honor caused him to assume the whole vast sum as a personal debt. "Time and I," he declared, "against any two;" and again, "If I live and retain my health, no man shall lose a penny by me." The struggle that followed was heroic, and Scott's facility in composition stood him in good stead. *Woodstock, The Fair Maid of Perth, Anne of Geierstein,* a *Life of Napoleon* in nine volumes, four volumes of historical sketches known as *Tales of a Grandfather,* were but a part of what came from his pen between 1826 and 1831. Friends and the public stood by him, and the new edition of his novels sold rapidly. Within two years from the date of the crash he had paid to his creditors nearly $200,000, and it seemed as if he might in time free himself from the debt. His health broke under the strain, however, and at length he consented to try a change of air. The government placed a vessel at his disposal, and he cruised about the Mediterranean, stopping at Naples and at Malta. It was in vain, and he begged to be taken back to Abbotsford before he died. His mind had partially failed after several paralytic strokes, and he came to believe firmly that the last of his debts had been paid. Happy in this belief he died, on September 21, 1832. He was buried at Dryburgh Abbey, where his wife had been laid six years before. In 1847 all of his voluntarily assumed obligations were paid off by the sale of copyrights, and his name was left as free as he himself would have had it.

**Estimate of the Novelist.** As in Scott's boyhood his playmates gathered round him and made him the center in their games, so in his manhood he drew to him all who knew him. His sunny, genial nature, his unfailing kindliness, the simplicity with which he bore his honors, made him one of the most attractive figures in all literary history. The crowds which visited him at Abbotsford often intruded on his time, but never did they find him other than courteous. And the influence which comes from his works is as strong and as wholesome as that from his life. While his poems have not kept the immense popularity which they had in their own day, they are still read widely and with pleasure for the stories they tell, the pictures they present and their constant movement. Occasionally, too, in his little lyrics, Scott reaches a great height. His novels are read perhaps more than those of any other author, and the modern tendency toward historical fiction may be traced largely to their influence. A.MC C.

There are several biographies of Scott, but that written by his son-in-law, Lockhart, is easily the best. Indeed, it ranks with Boswell's *Life of Johnson* as one of the greatest biographies in English. Consult, also, Jenks' *In the Days of Scott;* Stevenson's *Memories and Portraits.*

**SCOTT,** Walter (1867- ), a Canadian journalist and statesman, for a generation one of the best known men in the Canadian Northwest, and for many years the foremost Liberal in politics. It was in 1892, as part owner of the Regina *Standard,* that Scott first came into prominence. He was a native of Middlesex County, Ontario, but went west in early manhood and eventually settled in Regina. In 1894 he assumed the ownership and editorship of the Moose Jaw *Times,* which he relinquished after a year for the Regina *Leader.* Since 1900 the two papers have been under his control.

Previous to 1906 Scott combined political life with journalism. In 1900 and 1904 he was elected Liberal member of the House of Commons for Assiniboia West. In Parliament he was conspicuous in the negotiations which led to the organization of the provinces of Alberta and Saskatchewan. In 1905 he resigned from the Commons to become first premier of Saskatchewan; from 1905 to 1912 he was also minister of public works, and thereafter until 1916 minister of education. In 1916 ill health compelled him to resign the premiership, although he remained in the provincial assembly as a private member. The last years of his premiership were disturbed by the temperance agitation and by corruption in the Liberal party. Scott at first opposed the temperance movement, but later realized its strength and in 1915 took steps in the direction desired by the reformers by ordering all bars in the province closed after seven o'clock at night, and by other measures with temperance as their end. In 1916 the speaker of the assembly and several other members were involved in charges of bribery by the liquor interests and of misappropriation of funds intended for railway subsidies. Scott was personally absolved from all blame,

but the incident was not without its effect on his party's popularity.

**SCOTT,** WINFIELD (1786-1866), an American soldier who distinguished himself in active service in the War of 1812 and the Mexican War, and who was kept from fighting in the War of Secession only by his advanced age. Scott was born at Petersburg, Va. Though educated for the law he entered the army in early manhood, and upon the outbreak of the War of 1812 was commissioned lieutenant-colonel and went to the Canadian border. At the Battle of Queenstown Heights he was taken prisoner, but was later exchanged, and in 1814 fought at Chippewa and at Lundy's Lane. At the close of the war Congress conferred upon him the rank of major-general. Scott's next service was the preparation of the first complete manual of military tactics ever compiled for the United States army. During the next few years he was active in Indian affairs, and in 1841 succeeded General Macomb as commander of the army.

WINFIELD SCOTT
He fought in two wars, was commander of the United States army, and was prevented only by age from serving in a third great war.

Then came the war with Mexico. In the spring of 1847 Scott took chief command in the enemy's territory, and when the war closed he had to his credit the victories of Vera Cruz, Cerro Gordo, Contreras, Churubusco, Molino del Rey and Chapultepec, and the capture of Mexico City (see MEXICAN WAR). Though "Old Fuss and Feathers" as he was affectionately called by his men, returned from the war a national hero, he was defeated for President in the campaign of 1852, in which he headed the Whig ticket. Congress revived the rank of lieutenant-general for him in 1855, and it was conferred upon him by brevet. In 1861 he retired from active service, and five years later died at West Point. A two-volume autobiography was published by him in 1864.

**SCOTTI,** *skot'e,* ANTONIO (1866- ), an Italian basso whose excellent voice and high talents as an actor have brought him into the front rank of operatic stars. He was born in Naples. At the age of twenty-three he made his first appearance in grand opera at Malta, playing the rôle of Amonasro in *Aïda.* His début gave promise of future greatness which later tours in Europe and America abundantly fulfilled. In 1899 he sang for the first time in the Metropolitan Opera House, New York, and thereafter appeared regularly with the Metropolitan organization. His repertory includes *Don Giovanni, Faust, Othello, La Tosca* and *Il Pagliacci,* his finest work being done in Mozart's *Don Giovanni.*

ANTONIO SCOTTI

**SCRANTON,** *skran'tun,* PA., the county seat of Lackawanna County, is the third largest city in the state, ranking next to Philadelphia and Pittsburgh. Its population, which was 129,867 in 1910, had increased to 146,811 (Federal estimate) in 1916. Scranton is located in a valley of the Alleghany Mountains, at the mouth of Roaring Creek on the Lackawanna River, and in the northeastern part of the state, eighteen miles northeast of Wilkes-Barre and 134 miles northwest of New York City. It is on the Central of New Jersey, the Delaware, Lackawanna & Western, the Delaware & Hudson, the Erie and the New York, Ontario & Western railroads.

Scranton occupies an area of nearly twenty square miles on an undulating plateau averaging 800 feet above the sea. Some of the hills in the vicinity rise more than 1,000 feet higher. The surrounding region is rich in anthracite coal; the shipping of coal and the manufacture of heavy hardware and of textiles are the city's chief industries. Local estimates report an annual output of twenty million tons of coal from within a radius of ten miles of the city, a production worth fifty-four million dollars. The coal industry gives employment to about 45,000 men. The principal articles manufactured are nuts and bolts, foundry products, locomotive and stationary engines, knit goods, buttons, lace curtains and silk.

Nay Aug Park (ninety acres), situated among hills in the eastern part of the city, has, among other attractions, a fine swimming lake and bath houses and the Everhart Museum of Natural History. Adjoining Nay Aug is Luna

Park. Near the city in the surrounding hills are various lake resorts. Prominent features of Scranton are the Federal building, the courthouse, standing in the center of a parked square, a fine city hall, Albright Memorial Library, the administration buildings of the International Correspondence Schools, Y. M. C. A. and Y. W. C. A. buildings, Masonic Temple, several fine hotels and the new Delaware, Lackawanna & Western Passenger Station. Benevolent institutions include the Moses Taylor and state hospitals, the Oral School for the Deaf and Dumb and the Home of the Friendless. In addition to several private educational institutions the city has an Historical Society and a Society of Natural Science.

Scranton was founded in 1840 by Joseph H. and George W. Scranton. In 1854 it was incorporated as a borough and in 1866 and 1901, respectively, was incorporated as a third- and a second-class city.

**SCREW**, a mechanical device consisting of a cylinder with a spiral projection or ridge on its surface. The projection is called the *thread* and the cylinder the *body* of the screw. Cut from paper a right-angled triangle with an altitude at least three times the length of the base. Draw a heavy line along the edge of the oblique side of the triangle (its hypotenuse), and then roll the paper around a pencil, beginning at the wide end (see 1, in Fig. 1). The dark line around the pencil corresponds to the thread of the screw. In 2 of Fig. 1 is shown a section of the projecting spiral. The vertical distance (*s*) between two whorls of the thread is known as the *pitch*. The screw works in a nut having a spiral groove into which the thread of the cylinder fits, and the power is usually applied by a lever or a wheel which moves through the circumference of a circle. The power, it should be understood, is applied at the end of the lever.

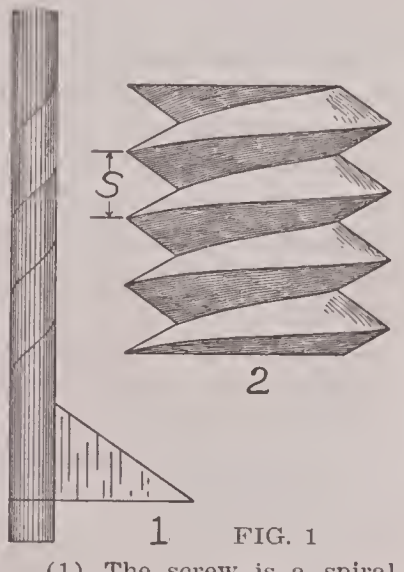



FIG. 1
(1) The screw is a spiral inclined plane. (2) The *pitch* of the screw is shown at *s*.

The mechanical advantage of the screw is stated thus:

With the screw a given power will support a weight as many times as great as itself as the circumference described by the power is times as great as the pitch of the screw.

A complete revolution of the screw raises the weight a distance equal to the pitch. A screw having five threads to the inch has a pitch of one-fifth inch.

**Application.** To ascertain the weight that can be raised by a screw through the force of a given power, multiply the power by the circumference of the circle which it describes, and multiply this product by the denominator of the fraction representing the pitch. (The circumference of a circle= 2×the radius×3.1416.) What weight can be raised by a power of 20 pounds, acting upon a lever 5 feet long and attached to a screw having a pitch of ⅕ of an inch? The power moves through a circle whose circumference=3.1416×2×5 feet or 31.416 feet. 31.416×12=376.992, number of inches. 376.992 ×20=7539.84. 7539.84×5 (denominator of fraction representing the pitch)=37,699.2. Therefore a weight of 37,699.2 pounds can be raised by the screw. (This is the theoretical result. Practically, the result is somewhat less because of the power used in overcoming friction.)

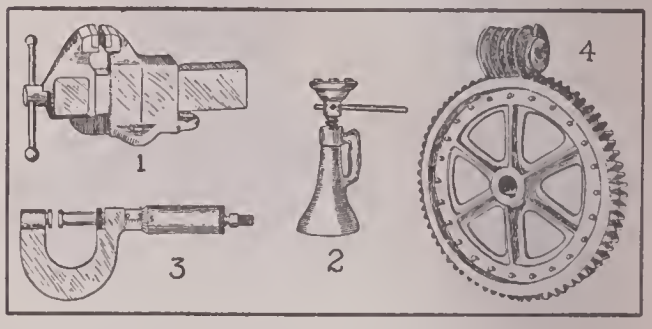



FIG. 2
(1) Vise; (2) jackscrew; (3) micrometer screw (see page 3791); (4) worm wheel.

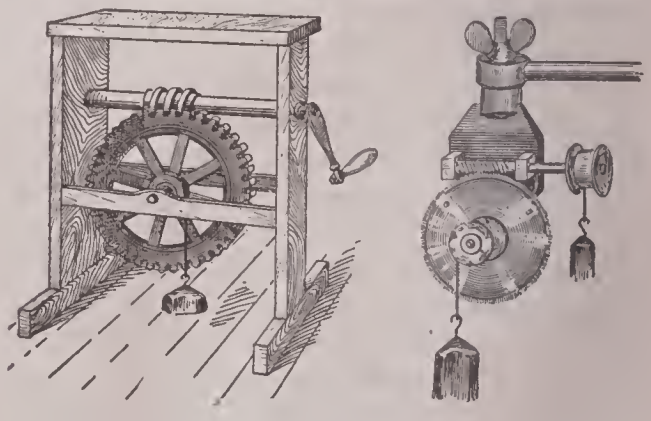


FIG. 3
Two forms of endless screws.

**Uses.** The screw is applied to so many uses that to name them all would be impracticable. We are all familiar with the wood screw used

by carpenters, and with the screw on the end of bolts. Nearly all vises (1, in Fig. 2) are opened and closed by a screw. The jackscrew (2) is used for raising buildings. The micrometer (3) measures minute distances by means of a screw having a very fine thread. The head of the micrometer screw is usually divided into hundredths, so that a hundredth of the interval can be measured.

**Endless Screw.** An endless screw consists of a thread on an axle that meshes into the teeth of a wheel. Such a device is sometimes called a *worm wheel* (4). Fig. 3 shows how the worm wheel may be used for raising heavy weights.

**SCRIBE,** *skreeb,* AUGUSTIN EUGÈNE (1791-1861), a French dramatist, born in Paris. He was educated for the law, but his tastes were literary, and he soon began to write for the stage. After early successes he undertook work in collaboration with other writers, and the result of this method was an extraordinarily large number of every type of drama—comedy, tragedy, vaudeville sketch and opera libretto—ascribed to his pen, to the number of over 400. He chose his characters from the middle classes and selected themes that were highly interesting and popular. Another reason for his great success lay in his thorough knowledge of dramatic construction; he was master of the technique of the stage, and later dramatists learned much from him. In 1836 he was made a member of the French Academy.

Scribe will always be best known for his librettos of *Fra Diavolo* and the *Huguenots,* two operas whose popularity will not wane. Other productions from his pen are now but little known; among these are *Robert, the Devil, Valérie* and *Adrienne Lecouvreur.*

**SCRIBES,** *skrybz,* a class of learned Hebrews who were required to copy the Scriptures, expound and interpret the law and keep the official documents of the kingdom. The earliest scribes were priests (see EZRA), but in later times this was not the rule. Most of the scribes belonged to the party of Pharisees and they constituted the scholarly leaders of that body. In *Matthew* XXIII, 14 and 25, Christ is recorded as rebuking the scribes and Pharisees for their hypocrisy. See PHARISEES.

**SCROFULA,** *skrof'u la,* a form of tuberculosis which is characterized by swelling of the lymph glands and by poor nutrition of the tissues. Usually the glands in the neck are affected, but the infection may occur in any lymphatic gland, and in many cases abscesses form in the swollen parts. The best course of treatment is that which is based on a recognition of the value of fresh air, nutritious food and warm and suitable clothing. Physicians generally prescribe cod-liver oil and similar tonics, and the glands are sometimes painted with iodine to reduce swelling; a local operation may be necessary in case of abscess.

In England scrofula was formerly called *the king's evil,* because it was believed that a victim could be healed if his sovereign touched him. There is a well-founded story that Samuel Johnson at the age of three was taken to London to be touched by Queen Anne. The practice is supposed to have originated with Edward the Confessor. See TUBERCULOSIS.

**SCRUPLE,** *skru'p'l,* a measure of weight used only by apothecaries. It is one-third of a dram, one-twenty-fourth of an ounce and one-two-hundred eighty-eighth part of a pound, and is equivalent to twenty grains (see table on page 1765, under DENOMINATE NUMBERS). The word is from the Latin *scrupus,* meaning a *sharp stone* and, figuratively, *uncasiness of the mind.* The word is also used in English to mean *reluctance* or *hesitation.*

**SCUDDER,** *skud'er,* HORACE ELISHA (1838-1902), an American author and editor, born in Boston and educated at Williams College. After his graduation in 1858 he taught school for three years in New York City, then entered business life, but soon withdrew to devote himself to literature. From 1890 to 1898 he edited the *Atlantic Monthly;* he wrote a sympathetic and important life of James Russell Lowell, edited the "American Commonwealths" series, and published various historical and biographical works, among which are *Noah Webster, A History of the United States, George Washington* and *Men and Letters.* Best known of his writings, however, are his works for children, which include *Seven Little People and Their Friends* and *The Bodley Books.*

**SCULPIN,** *skul'pin,* a group of oddly-shaped fish consisting of about 250 species, found chiefly around the rocky coasts in regions of the north. Their flesh is too coarse to be of much food value, but is eaten by peoples in the Arctic regions. The typical sculpin has a club-shaped body, spiny fins, large, grotesque mouth, and skin covered with warty projections. These fish prey upon small sea animals and are voracious eaters, often stealing the bait of anglers. They are themselves preyed upon by larger fish. Several names are applied to them locally, such as *miller's thumb, Irish lord* and *sea raven.*

## THE STORY OF SCULPTURE

**SCULPTURE,** *skŭlp'ture.* Among the arts of design three stand out preëminently — architecture, sculpture and painting. Architecture and sculpture, which preceded painting in point of time, had their origin in a far-distant period of the world's history, and in its primitive stages sculpture was a handmaid of the art of building. Primitive man first sought security from storms and attacks of wild beasts; then he turned his attention to the adornment of his rude habitation. Thus, in the caverns, lake dwellings and other abodes of prehistoric times appeared carvings on bones, stones and walls— the crude beginnings of what was to be one of the noblest of the arts. In the course of its development sculpture became the special medium for the portrayal of the human figure. A French critic has said:

"After admiring the universe man began to contemplate himself; he realized that the human form is adapted to the spirit; that its proportions, its symmetry, its ease of motion, its superior beauty, render it alone, of all living forms, capable of fully manifesting thought. Therefore he copies the human body, and sculpture is born."

**Processes.** While we are accustomed to think of the sculptor as one who hews a statue out of a block of marble, the actual work of the artist is quite different. Before the work in stone can be done a clay model must be made, and this model must be cast in plaster. The whole process is very interesting. The artist usually models a small figure of the statue to serve as a pattern. Then he reproduces this on a large scale, molding the clay on an iron framework of the required size. When the clay model is completed plaster of Paris is poured over the figure to a depth of two or three inches, and allowed to "set." Then the artist removes the clay, leaving what is called the "waste mold." Plaster of Paris is then poured into the mold, and when the plaster has hardened the waste mold is carefully clipped away. Thus a cast of the figure is obtained. In many instances different portions of the statue are cast separately, a practice known as *piece molding.*

The reproduction of the cast in marble is the next step. Usually the block of marble and the model are placed near each other upon pedestals. By means of an accurate pointing machine and other devices the important points of depression in the model are marked on the block and holes are drilled in the stone. Finally a skilled stonecutter hews the marble away according to the position of the holes, and the statue is ready for finishing touches. The finishing is done by the sculptor, but this is only a small feature of the work. In fact, many modern sculptors know little about actual carving in marble. It is known, however, that Michelangelo, whose supremacy in sculpture is unquestioned, hewed his creations from the marble block without the aid of a cast model, and this was also the custom of the earliest sculptors of antiquity.

Sculpture in bronze involves other processes. The colossal *Statue of Liberty* in New York Harbor is an example of the *repoussé* process, in which thin sheets of bronze are beaten into the desired shapes and fastened to a framework, or core. Statues are often cast in bronze by the following process: A core of fireproof material is made, having the shape of the intended figure, but made on a slightly smaller scale. A coating of wax is applied to this, and in it the details are worked out. Then a coating of fireproof material is applied, to serve as a mold, the core and outer coating being fastened together with bronze pins. Next, the figure is heated until the outer coating hardens and the wax melts and runs out of holes at the bottom.

Molten bronze is then poured in, filling the space formerly occupied by the wax, and when the metal has hardened the mold and core are removed, leaving a hollow metal statue, perfect in every detail.

The figures so far considered are examples of sculpture *in the round*. Figures are also carved upon a solid surface, so as to project from it, and are said to be *in relief* (see RELIEF).

## *History of Sculpture*

**Egypt.** It was in the valley of the Nile that sculpture first developed as a fine art. It is an interesting fact that in all other nations sculpture was in the beginning conventional, and later became free and natural, while in Egypt the reverse is true. The earliest forms of this art, reliefs in the tombs of the dead, are realistic portrayals of the daily life of the deceased and his family, or pictures of life after death. Statues in the round were also produced in the early period, and these have a freedom and a naturalness that make them comparable to Greek works of a later date.

As Egyptian sculpture developed it came under the influence of the priests, and the colossal figures of gods and kings, typical of the art in the height of its development, represent certain fixed conventions and limitations. The figures seem to belong to a "world of the tomb, one which never was alive." Yet they have a grandeur and dignity that make them very impressive. In the underground temple tombs of Abu-Simbel there are statues ranging from sixty to ninety feet in height. The Egyptian artists worked in marble, black, gray and red granite, basalt, limestone, bronze, wood, porcelain, ivory and many other substances, and the skill exhibited in the carving and finishing of hard materials indicates that they used very ingenious tools. The most remarkable monument of ancient Egyptian sculpture is the Sphinx at Gizeh, a huge figure with the head of a human being and the body of a lion. Nearly all statues, except those carved from colored material, were painted. For illustrations of Egyptian sculpture see page 1971 in the article EGYPT, and page 3070, under ISIS.

**Assyria.** See ASSYRIA, subhead *Art*.

**Greece.** While the earliest examples of sculpture in Greece indicate the influence of Oriental ideals, in its development this branch of Greek art bears out forcibly the saying that the "Greeks did not originate art but they invented beauty." There was not only a complete breaking away from Oriental tendencies, but an independent development in which sculpture reached the greatest heights it has ever attained. The first period of Greek sculpture, sometimes called the *Archaic,* lasted until the end of the Persian Wars, or about 480 B. C. From about 700 B. C. to 500 B. C. there was a formative era, in which the artists were gaining control of their materials, and definite schools were being established. The statues of this era are stiff and conventional, and many of them are draped. Following this era there was a period of development, in which the sculptor worked towards a freer, more natural expression of his ideal.

PAN
Statue in the Pitti Palace, Florence.

Then came the Persian Wars, the victorious outcome of which was a wonderful stimulus to the creative forces of the Greeks. As Athens, in Attica, was the center of the finest achievements in sculpture, the period of glory (480 B. C.-323 B. C.) is known as the *Attic Period.* Greek sculpture in Athens came into full splendor under the inspiration of the great statesman Pericles (which see), with whose name is always linked that of the supreme genius of ancient sculpture—Phidias. There was, however, a transitional period in which sculptors all over the Greek world were giving expression to that love for physical beauty which was stimulated by contemplation of the noble athletes competing in the national games. To this period belongs Myron, sculptor of the celebrated bronze *Discobolus,* or *Discus Thrower* (see illustration on page 1803).

Under the rule of Pericles Athens became a city of noble temples adorned with statues of the gods. Phidias not only designed the famous frieze for the Parthenon (see illustration at the

head of this article) but he executed a colossal statue of Athene for that temple, and one of Zeus for the temple at Olympia. The latter, a gold and ivory monument sixty feet high, was one of the Seven Wonders of the Ancient World. Phidias had several contemporaries of outstanding importance, including Polycletus of Argos, whose masterpiece was a statue of Hera, and Paeonius, of Mende, sculptor of a famous *Nike,* or *Victory,* set up at Olympia.

The sculptors of the age of Phidias idealized their subjects, giving expression in their work to a lofty religious aspiration. In the century following, which produced the so-called Later Attic School, the artists were more interested in individual traits of character, and sculpture became less heroic and more human. Portrait busts of living men were produced, and the statues of the gods revealed these divinities in their individual moods. That is, there was a decided tendency toward realism and a drift from idealization. The two greatest figures of this school were Scopas and Praxiteles. Scopas was one of the sculptors who assisted in the adornment of the Mausoleum at Halicarnassus, one of the Seven Wonders of the World (see illustration on page 3680).

The single undoubted original known to be the work of Praxiteles is a *Hermes* group discovered at Olympia in 1877. This priceless treasure is preserved in the museum at Olympia. Praxiteles, who is said to have "rendered into stone the moods of the soul," was also the creator of a matchless *Aphrodite,* set up in the temple to the goddess at Cnidus. The so-called *Venus de Medici,* in the Uffizi Gallery at Florence, is believed to be a copy of the Cnidian *Aphrodite.* The last Greek artist of whom we have any considerable knowledge, Lysippus of Sicyon (in Sicily), lived in the last half of the fourth century. He is not properly a representative of the Attic School, though he was greatly influenced by its traditions. Lysippus was celebrated for his works in bronze, especially his statues and portrait busts of Alexander the Great, and he was the leader of a school of art which adopted a new system of bodily proportions—small head, long legs and slender figure.

The death of Alexander the Great (323 B. C.) marks the end of the Attic Period and the beginning of the Hellenistic, during which Greek culture was diffused over the lands in Asia and Egypt conquered by Alexander. This period ends with the conquest of Greece by Rome, in 146 B. C. Rhodes, the chief city of an island of the same name in the Eastern Mediterranean, and Pergamus, a city in Western Asia Minor, were centers of important schools of sculpture during the Hellenistic Period. The former produced the celebrated *Colossus of Rhodes,* a figure of the sun god astride the entrance to the harbor of the city; the *Laocoön* group (see illustration on page 3330); and the *Farnese Bull* (see FARNESE). To the Pergamene school belongs the bronze original of the famous *Dying Gaul,* a copy of which is preserved in the Capitoline Museum, Rome. The Hellenistic Period also produced two famous statues, both of which show the influence of the Attic School. These, the *Nike* (Winged Victory) *of Samothrace* and the *Venus de Milo,* are pictured in the panel at the head of this article.

**Italy.** *The Roman Period.* Towards the end of the Republic, in the first century before Christ, an independent school of Roman Sculpture began to take form, but for some time before this the Romans had relied on Greece for the adornment of their temples and other buildings. During their career of conquering the Hellenic world they had borne away as trophies of victory numerous statues and bas-reliefs taken from Grecian temples, and Greek sculptors in large numbers flocked to Rome after the conquest of their country. During the early Empire, however, Roman artists produced some very commendable historic bas-reliefs and portrait statues, which were more than mere imitations of Greek models. The bust portraiture of the Romans had a realism and vitality which the Greeks rarely attained, and this realistic tendency was also manifest in their historic sculptures, such as the decorations on the Arch of Titus and those on the columns of Trajan and Marcus Aurelius. Mythological statuary, however, was inspired chiefly by Greek ideals and traditions. In the second century A. D. Roman sculpture entered upon a decline, and when Christianity became the state religion it deteriorated into a form of architectural decoration and lost all tendency to realism.

MARS RESTING
A statue in the Villa Ludovisi, Rome.

*Revival of Sculpture.* During the thirteenth century sculpture experienced a rebirth in Italy, and it was this revival that paved the way for the splendid achievements of the Renaissance. The leader in this movement was Nicola Pisano (1210-1298). His greatest masterpiece was a six-sided marble pulpit in the baptistery at Pisa, which he adorned with bas-reliefs representing scenes from the life of Christ. His son Giovanni also won distinction in the revival of art. He was the founder of the school of Italian Gothic sculpture, which emphasized dramatic expression rather than classic beauty, the elder Pisano's ideal. This early period also produced Andrea Pisano (1270-1348), carver of the reliefs on Giotto's Campanile at Florence; and Andrea Orcagna (died 1368), whose masterpiece was the tabernacle at Or San Michele, probably the most beautiful example of Gothic art in Italy.

*The Renaissance.* One of the great masters of the Early Renaissance was Lorenzo Ghiberti (1378-1455), famed for his wonderful bronze doors in the baptistery at Florence. Michelangelo said of them that they were worthy to be the gates of Paradise. Donatello (1386-1466), Lorenzo's contemporary, was the greatest genius of this era, and his influence dominated Italian sculpture until the High Renaissance, which culminated in Michelangelo. A third great name of the Early Renaissance is that of Luca della Robbia, who worked in terra cotta, marble and bronze. Sculpture through these masters and their followers advanced in naturalness, beauty of form, composition and technique.

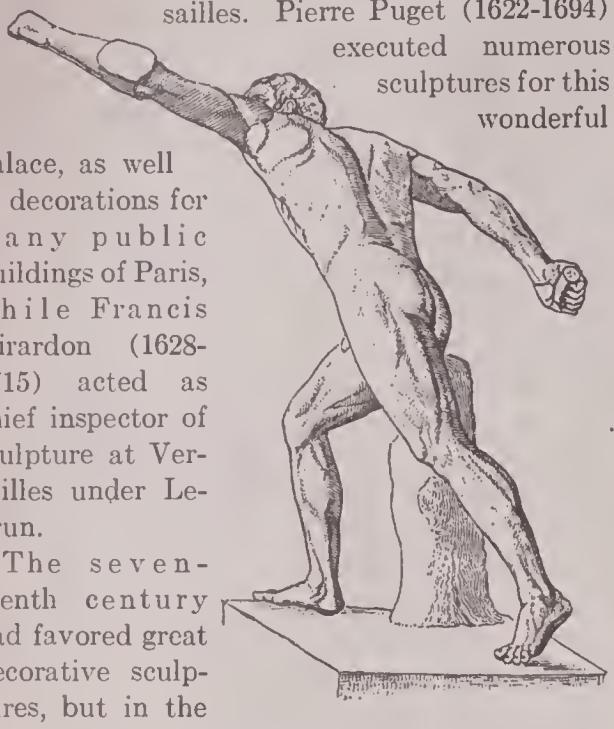
*High Renaissance.* It is characteristic of Italian sculpture of this period that there was no distinctly national school, but there were many schools, each centered in a special city. Siena, Padua, Venice and Florence were all centers of activity, but it was the Florentine school that produced the crowning figure of this golden age of Italian sculpture. What Shakespeare was to the Elizabethan drama, Michelangelo (1475-1564) was to the sculpture of his day. In him all previous efforts to interpret passion and feeling were summed up and concluded; he was not only supreme as a sculptor, but as a painter and architect, and his influence on modern art cannot be overestimated. His colossal *David* at Florence, the *Captives* in the Louvre, the *Moses,* in Rome (see illustration on page 3963), the statues in the chapel of the Medici at Florence, and the *Madonna,* in Bruges, are at once monuments to his individual genius and to the greatness of the period. His immediate successors, with one exception, were too much given to the imitation and exaggeration of his manner to achieve anything more than mediocrity; this exception was Benvenuto Cellini (1500-1571), noted not only for his work in bronze, but for his skill as a goldsmith. Italian sculpture of the seventeenth century culminated in Lorenzo Bernini (1598-1680), noted for his *Apollo and Daphne.* His death marks the last effort to keep Italian sculpture alive. He was the master of the "barocco" style, which aimed at elegance and grace at a sacrifice of purity of ideas. Then the art declined until Canova (1757-1822) brought new life to it.

NEPTUNE
With his symbol, the trident. [From a statue in the Lateran Museum, Rome.]

*Modern Italian Sculpture.* In the eighteenth century Italy again became the center of the classical revival which spread thence throughout Europe. The result was the rise of a style based upon a return to Greek ideals. Canova was the first to give expression to this new conception; his *Cupid and Psyche* and *Pauline Borghese* are good examples of his art, which was characterized by imagination and grace, but somewhat lacking in the emotional element. His followers were close imitators. Only that which was strictly after the antique was admitted into the Italian academies, and art degenerated into a cold conventionalism which was dominant until Lorenzo Bartolini (1777-1850) initiated the newer Florentine naturalistic school. The later nineteenth century Italians, with the exception of Consani, Albani and Fedi, drifted toward a naturalism which tended to become a debased realism.

**France.** The rise of an independent school of sculpture in France dates from the early sixteenth century, when the Italian Renaissance began to exert its influence upon all Europe. About this time Tours was the foremost art center in France, and Michel Colombe (1431-1514) was the founder of its school of sculpture. Francis I, the Renaissance king of France, used his influence to build up a school of French sculpture; among the noted sculptors whom he

appointed to execute great decorative works was Jean Goujon (1520-1572), whose art is best represented by his *Fountain of the Innocents* in Paris. One of the first acts of Louis XIV was to commence the building of the Palace of Versailles. Pierre Puget (1622-1694) executed numerous sculptures for this wonderful palace, as well as decorations for many public buildings of Paris, while Francis Girardon (1628-1715) acted as chief inspector of sculpture at Versailles under Lebrun.



ROMAN GLADIATOR
A statue by Agasias of Ephesus (second century B.C.), known as the Borghese Gladiator; in the Louvre, Paris.

The seventeenth century had favored great decorative sculptures, but in the eighteenth century there was a tendency toward single-figured statues. Among the great artists that developed were Jean Antoine Houdon (1741-1828), a famous portrait sculptor; Joseph Bosio (1769-1845), whose bronze quadriga (two-wheeled chariot with four horses abreast) surmounts the triumphal arch of the Place du Carrousel in Paris; and François Rude (1785-1855), who absorbed the patriotic spirit of the Revolution and expressed it in his *The Marseillaise,* the great bas-relief on the Arch of Triumph in Paris. The effects of the Romantic Movement left their impress upon the nineteenth-century French sculptors, among whom were Antoine Barye (1795-1875), sculptor of wild animals; and Jean Baptiste Carpeaux (1827-1875), creator of numerous portrait busts and sculptures on the New Opera House in Paris. By far the greatest figure in modern French sculpture is Auguste Rodin, a zealous advocate of the idea that Nature alone should be the artist's source of inspiration. He is one of the greatest realists who ever lived.

**Germany.** Germany slightly preceded France in point of time in the development of a national Renaissance style. Adam Krafft (1480-1507) of Nuremberg, a center of the so-called Franconian school, did much to raise the art of sculpture in stone to a high standard of excellence. His friend and countryman, Peter Vischer (1455-1529), turned his attention to casting in metal, and became famous as a bronze worker. Albrecht Dürer (1471-1528) was noted both as a sculptor and painter. Then came the devastating Thirty Years' War, and the history of sculpture was a blank for many years.

The modern school of sculpture in Germany can be traced to the influence of Thorwaldsen, the Dane, a disciple of classical art. The first exponent of the classical revival in Germany was Johann Dannecker (1758-1841). He was followed by John G. Schadow (1764-1850) and Christian Rauch (1777-1857); the latter's masterpiece is his statue of Frederick the Great in Berlin. He was the founder of the Berlin school of sculpture, and his work shows a harmonious blending of naturalism and idealism. Others who worked along similar lines were Ernest Rietschel (1804-1861), Friedrich Drake (1805-1882) and August Kiss (1802-1865). Among sculptors of recent fame are Begas, Wolff, Hildebrand and Schilling.

**England.** This country for many centuries gave little encouragement to those who labored with marble and bronze. Of the Renaissance sculpture very little is extant, and it was not until the reign of Charles I that any great progress was made. The first noted sculptor of this time was Nicholas Stone (1586-1647), whose fine tombs at Westminster Abbey show a tendency toward higher art. Thomas Banks (1735-1805) is regarded as the father of ideal English sculpture, though he was unappreciated in his day. John Flaxman (1755-1826) brought the classical spirit into English art and founded the school of the nineteenth century. His *Saint Michael Overcoming Satan* and *Apollo* show how nearly he approached the spirit of sculpture of Greece. For fifty years after Flaxman the English sculptors were swayed by Canova's art. John Gibson (1791-1866), the most popular of Canova's English pupils, is best known through his *Narcissus, Psyche Borne by Zephyrs* and *Hylas Surprised.* John H. Foley (1818-1874) and Patrick MacDowell (1799-1870) were the last great representatives of the classical school.

Alfred Stevens (1817-1875) was one of the first disciples of the modern school of naturalism. He executed the finest decorative sculpture in England, the *Monument of the Duke of Wellington,* in Saint Paul's Cathedral. But the leaders of this movement were two famous

painters, Frederick Leighton (1830-1896), whose *Athlete Struggling with Python* is now in the Tate Gallery, and George F. Watts (1817-1904), whose *Clytie,* in the same gallery, is a work of beauty and great power. Among the later sculptors of distinction are Thomas Brock (1847- ), who represents a revolt against classicism; William Hamo Thornycroft (1850- ), a sculptor of classical tendencies; Alfred Gilbert (1854- ), the first English sculptor to preach and practice individualism; Edward Onslow Ford (1852-1901), famed for his delicately modeled portrait busts and statues; and J. M. Swan (1847-1910), a noted sculptor of wild animals.

**Denmark.** Bertel Thorwaldsen (1770-1844), next to Canova, exerted the most influence upon the art of his day in bringing about the classical revival. He is the greatest figure in the history of Danish art.

**United States.** Early American sculptors of prominence were influenced chiefly by the art of Thorwaldsen and Canova, and their work is classical in spirit. Among them were Horatio Greenough (1805-1852), Hiram Powers (1805-1873), sculptor of the celebrated *Greek Slave,* William Wetmore Story (1819-1895), Randolph Rogers (1825-1892) and Harriet Hosmer (1830-1908). A more distinctly American art was developed by such artists as Thomas Ball (1819-1911), Henry Kirke Brown (1814-1886), J. Q. A. Ward (1830-1910) and John Rogers (1829-1904). The Centennial Exposition, held at Philadelphia in 1876, is a landmark in the history of American sculpture, for since that time American artists have been wholly free from the influence of classic art. The most powerful influence has been that of the Paris schools and studios, in which numerous American sculptors have sought inspiration and knowledge. The best representatives of modern sculpture in the United States include Saint Gaudens and his gifted pupil Frederick MacMonnies, Daniel Chester French, Paul Bartlett, Charles H. Niehaus, A. P. Proctor, George Grey Barnard, Gutzon Borglum, Lorado Taft and C. J. Mulligan. B.M.W.

Consult Shedd's *Famous Sculptures and Sculpture;* Taft's *History of American Sculpture;* Hurll's *Greek Sculpture;* Perkins' *Italian Sculptors.*

**Related Subjects.** The following articles in these volumes will supplement the above discussion of sculpture:

Alto-Rilievo
Bas-Relief
Bust
Carving
Colossus
Elgin Marbles
Liberty, Statue of
Mezzo-Rilievo
Parthenon
Relief
Sphinx
Venus de Milo
Winged Bull
Winged Lion
Winged Victory
Wood Carving

SCULPTORS

Algardi, Alessandro
Ball, Thomas
Barnard, George Grey
Bartlett, Paul Wayland
Borglum, Gutzon
Brown, Henry Kirke
Canova, Antonio
Cellini, Benvenuto
Crawford, Thomas
Donatello
French, Daniel Chester
Ghiberti, Lorenzo
Goujon, Jean
Greenough, Horatio
Hosmer, Harriet
Houdon, Jean Antoine
Leighton, Frederick
Lysippus
MacMonnies, Frederick
Michelangelo Buonarroti
Partridge, William Ordway
Phidias
Powers, Hiram
Praxiteles
Rauch, Christian
Rietschel, Ernst
Robbia, Della
Rodin, Auguste
Rogers, John
Rogers, Randolph
Rude, François
Saint Gaudens, Augustus
Schilling, Johann
Stoss, Veit
Taft, Lorado
Thorwaldsen, Bertel
Ward, John Q. A.
Watts, George F.

**SCURVY,** *skur'vi,* a disease that was first prevalent among sailors during the period of long sea voyages following the discovery of America. It was caused by improper food and drinking water, when the crews were forced to live upon salt beef, hard tack and stagnant water for months at a time. The faces and bodies of victims would swell in places and show dark purple patches where blood vessels had broken beneath the skin; the teeth would become loose, the gums would ulcerate and bleed and the tongue swell and turn black. In severe cases the victim would become utterly exhausted and die of weakness or hemorrhage.

Sea scurvy is now almost unknown, though the disease sometimes occurs in camps and prisons or in besieged towns, where sanitary conditions are bad, and it is impossible to secure a variety of food. Improperly-fed infants occasionally contract a form of scurvy known as *Barlow's disease.* Treatment is necessarily along dietary lines. People who eat plenty of vegetables never contract scurvy, and lemon juice has been found a valuable preventive of the disease. The latter is by law required to be a part of the diet of all sailors in the British navy.

**SCUTARI,** *skoo'tah re,* a fortified town of Albania whose history dates back to the days of the ancient Romans, when it was called Scodra. It lies on the southeastern shore of the Lake of Scutari, about twelve miles from the Adriatic Sea, and is built on a plain enclosed on three sides by mountains. Near the town is

the meeting point of the Drin and Boyana rivers, the latter of which is navigable for small ocean vessels. The people of Scutari export skins, woolen goods, grain, tobacco, sumac, and a kind of sardine caught in the Boyana, and engage in the manufacture of firearms and cotton goods. Until 1913 Scutari was the capital of the Turkish vilayet of Scutari, but in that year, during the Balkan War, it was captured by the Montenegrins and became a part of the independent principality of Albania (see BALKAN WARS, page 554). In 1914, during the War of the Nations (which see), Scutari was again occupied by Montenegrins, but was recaptured by the armies of the central powers. In 1914 it had a population of about 32,000.

Scythes were used formerly for cutting grain, but the work was very tedious, and they have been supplanted by modern reaping and mowing machines. The scythe consists of a long, curved blade with a sharp edge, attached to the lower end of a long, upright handle called a *snath*. This is set at the proper angle for swinging the blade against the standing grass. Two short handles are made fast to the straight or crooked snath, some distance apart. As they are adjustable, the mower can place them up or down the main handle to suit his height. The cradle scythe has a blade about three and one-half feet long, attached to a four-foot handle on which another shorter handle, or helve, is also fastened. The cradle is a piece of wood with several teeth, joined to the heel of

VARIOUS FORMS OF SEA ANEMONES

**SCYLLA,** *sil'ah,* in the Greek myth, a famous, six-headed sea monster, who was once a beautiful maiden, but was changed by Circe because of the latter's jealousy. She lived in a cave in a great cliff, so high that the top could never be seen. It was her custom to thrust her heads out of the cave and seize the animals and men that passed. From every ship each head took toll. Opposite the cliff of Scylla was Charybdis, another monster who continually drew in the water and threw it out again. The ancients located the rock Scylla and the whirlpool Charybdis in the strait of Messina. The difficulty of steering between the rock and the whirlpool gave rise to a popular expression, "between Scylla and Charybdis," as indicating two dangers, or evils, one of which must be chosen. "Between the devil and the deep sea" is a similar expression.

**SCYTHE,** *sythe,* a mowing implement, used principally for cutting tall grass and weeds. the blade. It catches the grain as it falls and lays it in even rows for binding. See MOWING MACHINE; REAPING MACHINE.

**SEA ANEMONE,** *a nem' o ne,* a group of interesting sea animals having much the appearance of flowers, from which fact the name is derived. They are second lowest among the great divisions in the animal kingdom, and with the jellyfishes and corals are placed in the branch *Coelenterata* (which see). As may be seen by the illustration, sea anemones differ somewhat in size and form, but in general the body is vaselike, with fringes of tentacles about the mouth. The average diameter is three inches, and they show varying hues of bright colors. These animals usually remain fixed through life to rocks or other places of attachment, but they have the power of slowly moving along on the base of the body. They are found in tide pools and on piles of wharves in harbors, as well as in deep waters.

It is by means of its tentacles that the sea anemone obtains its food, which consists of a variety of small sea animals. Certain tentacles are equipped with so-called lasso cells, which throw out barbed threads that paralyze the creatures they strike. The prey is then dragged into the mouth cavity by other tentacles and digested in a digestive canal. Some of the tentacles bear specks that serve as organs of sight. Sea anemones reproduce by eggs or by budding; in the latter case the new organism grows out from the base of the body and is finally detached, forming a new individual.

Consult Arnold's *The Sea Beach at Ebb Tide;* Mayer's *Sea-Shore Life.*

**SEA CUCUMBER,** *ku'kum ber,* the popular name of a group of sea animals belonging to the same branch as the starfishes, sea urchins and sea lilies (see ECHINODERMS). As the name indicates, they have long, rounded bodies, shaped somewhat like the familiar garden vegetable. At one end of the body there is a large mouth opening, encircled by a series of branching tentacles. These the animal expands and

SEA CUCUMBER

contracts as its seizes its food. It has five double rows of tube feet, which can be extended and used as organs of locomotion. There are several different species, found in all parts of the ocean. Those inhabiting tropical waters sometimes grow to be two or three feet long, but the sea cucumbers of temperate regions are only a few inches in length. Large numbers of an edible species are caught off the Great Barrier Reef of Australia and sent to Chinese markets under the name of *trepang* (which see).

**SEA HORSE.** See HIPPOCAMPUS.

**SEAL,** a word derived from the Latin *sigillum,* meaning a *mark* or *sign.* It is usually a device impressed on paper, metal or wax, to be attached to a document, together with a signature. The practice of using a seal on documents of importance has been followed without interruption since the fifth century before Christ, in the golden age of Greece. In Rome the Popes very early began to attach leaden seals to their official communications; these seals, called *bullae,* gave rise to the *bull* of the Popes.

In olden times it was customary to wear a ring, called a *signet ring,* flattened at the top, on which was engraved some special device. This ring, an ornamental finger ring, usually, was used to seal letters and documents, the design being pressed on the surface of the parchment or paper. The seal ring of the present day is the development of the older signet ring. The legal expression of "signed, sealed and delivered" is a relic of the times when both signature and seal were necessary to prove authenticity of letters.

**Seals of Government.** Every country, province and state has an official seal, without which no legislative act can go into effect. Such a seal must be affixed by the Secretary of State, in whose custody the official seal reposes. The legislative branch of a government—congress, state legislature or parliament—decides upon the character of the seal, which when once adopted cannot be changed except by the same law-making authority. Each of the forty-eight seals of the states of the American Union and the provincial seals of the Dominion of Canada are pictured in these volumes, accompanying the articles describing those political divisions.

**Great Seal of the United States.** On the day the thirteen American colonies proclaimed their independence (July 4, 1776) Benjamin Franklin, Thomas Jefferson and John Adams were appointed a committee "to prepare a device for a Great Seal of the United States." Their report followed in sixty days, but was not acted upon. In 1782 a seal was proposed which was acceptable to Congress and was adopted. It was not changed until 1885, when the Congress ordered a new design. Both sides of the present seal are shown in article UNITED STATES. The olive branch and arrows denote the hope for peace and the power for war, both peace and war being subject to the will of Congress, which body is typified in the eagle. The constellation denotes the thirteen original states of the

Union; the escutcheon is borne unsupported on the breast of the eagle, denoting that the country should rely solely upon its own strength and virtues. The pyramid on the reverse side signifies duration and solidity. The eye above it and the motto above refer to the many interpositions of Providence in favor of the American people. The date (1776) in Roman numerals and the lower motto signify the beginning of a new era at that time. F.ST.A.

**SEAL,** a strangely-formed, warm-blooded, air-breathing animal which has its various body structures so modified that it is able to live in the water as well as on the land. However, except at the mating season, seals spend most of their time in the sea.

**What a Seal Looks Like.** If seen on land, a seal is incredibly awkward, but in the water it is beautiful and graceful. It has a tapering body, with thick, woolly fur and long, shining hair, and is so sleek and oily that it glides easily through the water, finlike feet serving as paddles and as rudder. Particularly graceful are the quick, darting movements with which it seizes upon its prey of small fish. A seal has a tail, but it is so short as to be practically useless, while the limbs also are short, the greater part of their length being hidden beneath the skin. The head is small and round, the neck short, the mouth large and provided with numerous "feelers," like those of the cat.

**Where Seals Live.** The Caspian Sea and Lake Baikal have two species of seals, but with these exceptions all members of the family live in the ocean. For the most part they do not like the warm climates, though a few species do live in the tropic and temperate zone seas. But toward the far north and the far south the sea teems with them. They tumble about in the water most of the year, but at breeding time are to be seen in vast numbers on the shore rocks and the icebergs. It is not only their thick coat of fur, or hair, which protects them from the extreme cold, but the layer of fat, or blubber, which lies just under the skin. Intended thus solely for their protection, this blubber has contributed to their destruction, for it is one of the things which men much desire as an article of commerce, and for it seals have been killed by thousands.

**Intelligence of Seals.** Seals of one species or another have long been familiar in zoölogical gardens, where children have delighted to watch their awkward movements as they draw themselves up on the rocks, and to listen to their hoarse barking; but in recent years men have found another way to make these animals contribute to their amusement, and trained seals are now an important part of almost every circus. Just because they are so lumbering and awkward and seem so much farther down in the scale of life than any of the land animals, the tricks which they perform seem almost incredible. Some students claim that their teachableness is a sign of their superior intelligence, while others declare that it is but the outgrowth of instinct and of a desire for the fish which the keeper gives them at intervals.

Certain it is that seals in their native haunts seem far from intelligent. The homing instinct they possess to perfection, coming back each year to the same breeding spot as unswervingly as a bird returns to its last year's nesting tree; but that suggests a lack of intelligence rather than the contrary, for it is on these well-known breeding spots that they are most likely to meet with destruction at the hands of men.

The life habits of seals are very interesting. As they have been studied most closely in connection with the *fur seal,* they will be discussed in the section of this article devoted to that species.

**Kinds of Seals.** A thoroughly satisfactory classification of seals has never been made, but a simple, serviceable division separates them into two groups; these are the *cared seals,* which have external ears and for the most part sóft fur under their long hair, and the *true seals,* which have no external ears and no fur.

To the former group belong the *fur seal,* or sea bear, and the *sea lion,* while in the latter are included the *common seal,* or harbor seal, the *harp seal* and the *elephant seal,* or sea elephant. Some authorities include the walrus among the seals, but while it is related it does not belong to the same family as those which are mentioned above. See WALRUS.

## *The Fur Seal*

By far the most important commercially of all the seals is the fur seal. It has another name—*sea bear*—which is perhaps better than its usual one, for it seems to be more closely related to the bears than to the true seals. True, it likes fish and it spends much of its time in the water, but beyond that its seal-like points are few, while structurally it is very much like a bear. It can move about on land far more easily and rapidly than does the true seal, scaling the rocks and even running in a lumbering manner. What makes the sea bear so valuable is the soft, dense fur, usually brownish black, which is almost hidden by the water hair. A live seal is not beautiful and soft and glossy like a sealskin coat, for the long outer hair is coarse and grayish.

FUR SEALS, ORIGINAL OWNERS OF LADIES' SEALSKIN COATS

**Life Habits.** Time was when there were great herds of these seals, but they have been killed literally by millions for their fur, and to-day the few herds that remain are very small as compared with their former size, and great fear is felt lest they may become extinct. Most important of all the fur seals is the herd, forming a distinct species, which makes its home on the Pribilof Islands, a barren group in Bering Sea.

Fascinating indeed has been the study of the curiously ordered life they live there, and men of science have sought the islands as eagerly as have the fur traders. Through the winter the seals which make up this herd are scattered about the waters of the North Pacific; some of them never leave the icy seas about Alaska, but others venture as far south as the coast of California. But wherever they may be, when spring comes instinct leads them back to the desolate little islands. By thousands they arrive, the old males, or bulls, first; and many of them have some specially favored places which they seize each year, fighting to the death with any intruder. A seal bull is a formidable creature, frequently weighing as much as 400 pounds, and he regulates his household and his surroundings as he sees fit.

Several weeks after the bulls have arrived the females, or cows, come; they are graceful, gentle creatures, not usually more than one-fourth as large as their lords and masters. These seals are polygamists; each bull gathers about him as many females as he can, sometimes as many as a hundred, and over these he exercises the strictest care. Other bulls will try to steal them, but this he is prepared for; and to prevent it he will fight viciously. Hundreds of the females are torn in pieces every year by these contending males, and the rocks echo and reëcho with the roaring of the fight-

ers. Strangely enough, through all of this period of exertion the males fast; they do not taste food from spring until August or thereabouts.

Soon after the adjustment into households is completed the little seals, or pups, are born. They are sleek, squirmy little animals, weighing about ten pounds each, and from the first are as playful as kittens. Soon after her baby's arrival the mother seal becomes hungry, and swims away in search of food. The little seals are left in a great group, or *pod,* hundreds of them together, with absolutely no mark to distinguish one from another, but the mother on her return after a week's absence has no difficulty in identifying her offspring; unerringly she picks out her own pup, now clamorously anxious for food. Attempts have been made to show that these mother seals have a real affection for their young, but the tales of their devotion have been much exaggerated. The theory, however, has given rise to at least one charming poem, Kipling's *Seal's Lullaby,* in which he says:

Oh, hush thee, my baby, the night is behind us,
And black are the waters that sparkled so green,
The moon, o'er the combers, looks downward to find us
At rest in the hollows that rustle between.
Where billow meets billow, there soft be thy pillow;
Ah, weary wee flipperling, curl at thy ease!
The storm shall not wake thee, nor shark overtake thee,
Asleep in the arms of the slow-swinging seas.

A group of young seals learning to swim is, say those who have watched it, a most amusing sight. The six-weeks-old babies do not "take to water like a duck," for their heads are very heavy and the rest of their bodies disproportionately light, and they find as great difficulty keeping themselves in swimming position as do young birds in learning to fly.

Until November or December, according to the weather, the herd remains on its favorite *rookery.* Discipline is relaxed, and the females and young bulls are no longer dominated and terrorized by the old bulls. There then comes a day when the seal instinct says "Go," and the great herd puts off into the sea until another spring shall come round. On several other groups of islands, some belonging to Russia and some to Japan, are other herds of fur seals, but none is so large or so important as this Pribilof Island herd.

**Securing Sealskins.** The young males are the class killed for fur, for there are as many males born as females, and since every bull has a large harem, many of the males are unnecessary. Since the old bulls will not allow them to set up families until they are seven or eight years old, the young males herd by themselves, and the hunters kill them by clubbing them when they are on land. The skins—which must be removed carefully, as a cut skin is rejected—are salted and packed in the holds of vessels until the close of the season. A long process is gone through before these rough, hairy pelts become the beautiful skins that are placed on the market. The coarse gray hair is removed, leaving the soft fur exposed, and the skin is carefully dyed, not by dipping, but by repeated treating with a brush.

**Fur-Seal Legislation.** The United States, after it came into possession of Alaska, attempted to regulate most carefully the killing of seals on the Pribilof Islands. A lease was given to but one company, which was allowed to take only 100,000 skins a year, and those only from male animals; but the demand was far greater than this supply, and seal poaching, or stealing, became most common. The poachers did not dare approach the islands and kill the seals on land, but frequented the neighboring waters in the summer time and took the seals from the water. All of these were of necessity females, since the males remain on land all summer, and for every mother that was killed a baby seal on the rocks starved to death. In twenty years, it was estimated, a million females were killed in the sea, and a million pups died in consequence. Stricter and stricter regulations were passed, for it became clear that the seals would sooner or later be exterminated, and in 1910 a law was passed by Congress prohibiting seal killing absolutely for five years. The islands can be patrolled, but to stop poaching in the open sea is far more difficult, as no one nation has jurisdiction over the water more than three miles from shore. To-day not more than 200,000 seals return each year to the Pribilof Islands, in place of the millions that visited the spot thirty years ago.

## *Other Seals*

**Sea Lion.** This is another eared seal, a near relative of the fur seal, from which, however, it differs in one important point. It is a hair seal, that is, it has not the soft underfur which

makes the other so valuable commercially. There are two chief groups of sea lions—the so-called Steller group and the California sea lions. The former reach the greatest size of any of the eared seals, the males attaining a length of from ten to fifteen feet and a weight of from 1,000 to 1,300 pounds. In all the northern Pacific, from California to Japan, this huge animal is to be found, and the Indians of the Aleutian Islands count them among their chief prizes. They eat the flesh, either fresh or dried,

THE SEA LION

use the skins for boat coverings and the flippers for boot soles, blow up the stomach to serve as an oil bag, and make thread of the sinews.

The other sea lions are those timid, gentle creatures which are seen in such numbers on the Cliff House rocks at San Francisco. They are much smaller than the species described above, and are almost black. Nearly all the seals seen in menageries and circuses are of this species.

**True Seals.** Of the true seals the commonest is the little, yellowish-brown harbor seal, which is an interesting visitor in Atlantic ports. Like the fur seals, the harbor seals are in danger of extermination, for while they have no fur they yield a valuable oil, and their skin is used for leather. Strangely enough, this animal shows a real delight in musical sounds, but its own voice is far from musical, being a sort of bleat which has won for the animal the name of *sea calf*.

**Sea Elephant** or **Elephant Seal.** This is the largest of all the seals, a huge creature which may measure thirty feet in length. It is a hideous appearing animal, with its small eyes, long, tusklike teeth, and the short, wrinkled *trunk* which gave it its name, but it is very valuable, for a single male has been known to yield over 200 gallons of oil. Formerly sea elephants were numerous along the coasts of Lower California and Mexico, and great rookeries existed as far north as Santa Barbara, but like other members of the seal tribe the sea elephants have been ruthlessly slaughtered until now they find a peaceful home only on some of the islands in the Southern Pacific. In their manner of life they much resemble the fur seals, especially in the fights which the males wage for possession of the females and in their fondness for their chosen spots. A.MC C.

Consult *Treasury Department Document No. 2017*, "Fur Seals and Fur Seal Islands of North Pacific Ocean," Washington, D. C.

**SEA LEMON,** a free-moving mollusk found in the warmer parts of the ocean, so called because it somewhat resembles a lemon in shape and is yellowish in color. It has a soft body like a jellyfish, and is without a shell covering. The gills form a tuft of plumes on the back of the animal, and at the front there are two leaflike tentacles. The sea lemon glides about slowly by means of a flat foot. The adult animal is about three inches long. See MOLLUSKS.

**SEA LILIES.** See CRINOIDEA.

**SEAL'ING WAX,** a composition of rosin, shellac, turpentine and coloring matter used for sealing letters and documents and for taking the impression of seals. Before the advent of envelopes with gummed flaps sealing wax was in general use for sealing letters, but now it is seldom employed for that purpose. That used for letters and documents is colored with vermilion and placed on the market in the form of sticks. An inferior grade used for sealing packages is usually colored with lampblack. An inexpensive wax for sealing bottles and cans of preserved fruit is made by mixing nine parts rosin with one part beeswax and heating the mixture until melted. If coloring matter is desired lampblack or ocher may be used. The necks of the bottles should be dipped in the wax. Sealing wax is supposed to have been invented by the Chinese in the seventh century.

**SEA LION.** See SEAL, subhead *Sea Lion*.

**SEARCH,** RIGHT OF. A nation at war has the right under international law to visit and search merchant ships of neutral nations for the purpose of verifying the nationality of the vessel and of ascertaining whether or not the cargo includes property of the enemy, or merchandise that is contraband of war (see CONTRABAND). The visitation and search must be made by the officers of a warship of the belligerent.

Right of search is not permissible in times of peace, except when a cruiser is sent in pursuit of a merchant vessel suspected of violating the revenue laws, or when there is good reason for suspecting that a vessel is a pirate.

In making the search the ship's papers are first examined. These papers contain the name of the master, the name of the ship, the name of the port from which the ship has sailed and of the port for which it is bound. The papers should also contain a description of the cargo, and should certify that the officers have complied with the customs regulations of the country from which it has sailed. If the papers are correct the search usually ends with their examination. If, however, suspicion is aroused, the cargo is examined. Any officer refusing to stop his ship and to allow it to be searched by proper authorities is liable to have both ship and cargo confiscated.

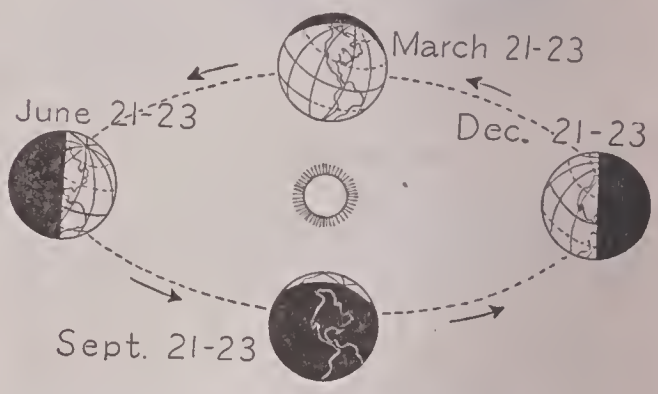
The Hague Conference of 1907 and the conference in London in 1909 threw a number of restrictions around the right of search. One of these was that the mails of neutral nations should be free from search and that in case the neutral vessel was detained these mails should be forwarded at the earliest possible date. However, Great Britain set this and various other provisions of these conventions temporarily aside soon after the outbreak of the War of the Nations, as a necessary measure against spies, while Germany, in its submarine warfare, established new precedents altogether in the matter of intercepting commerce.

The right of search in times of peace, in so far as it applies to the private premises, persons and property of peaceful citizens and subjects, is safeguarded by law. See PEACE CONFERENCE, INTERNATIONAL; WARRANT, subhead *Search Warrant*.

**SEASICKNESS,** *se'sik nes,* a disagreeable illness resulting from the pitching and rolling of a vessel at sea. The symptoms are dizziness and pain in the head, nausea, a sinking sensation in the stomach, and vomiting. In case of a severe attack the skin becomes pale, almost green, and damp; the pulse is feeble and the whole body utterly exhausted. Seasickness is the result of a lack of nervous adaptability; this may be described as a failure of the nerves to adjust themselves to having the sense of balance upset. But why this sort of nervous shock should result in acute illness no one knows. The same type of disturbance is experienced by those people who become ill from swaying in a hammock or swing.

Nothing has been discovered which will prevent seasickness, and there is no positive cure for it. Some obtain relief by using a nerve sedative; for others a nerve tonic is better. The quickest relief is gained by lying motionless, preferably in the open air, with the head low. Liquid nourishment should be taken, if possible, to keep up the strength. Seasickness, provided there are no complications, is never fatal. In most cases, unless there are severe storms, the attack disappears after a few hours and does not return again during the same voyage. The susceptibility of different persons to seasickness varies considerably. There are many people who seem to be immune.

**SEASONS,** *se'z'nz,* the periods into which the year is naturally divided, by changes in temperature and by alterations in the lengths of the days and nights. In the course of a year the earth revolves around the sun, always with its axis tipped or inclined a little (23½°) toward the plane of its orbit. For about half the year the vertical rays fall north of the equator; on the 21st of June they are farthest north, and on that day summer begins in the northern hemisphere and winter in the southern. On the 22nd of December the conditions are exactly reversed. On the 21st of March the sun is at the vernal equinox, and on the 22nd of September at the autumnal equinox; on these days the sun is directly over the equator. In the northern hemisphere spring and autumn, respectively, begin on these days Thus spring extends from the vernal equinox (March 21) to the summer solstice (June 21); summer from the summer solstice to the autumnal equinox (September 22); and winter from the winter solstice to the vernal equinox.




THE SEASONS

In summer the northern part of the earth is more than half in sunshine and the southern part more than half in darkness. Thus a point in the north has daylight during the greater part of the twenty-four hours of the day. The farther north one goes the more daylight he finds, and around the Pole there is no darkness during this season. In the winter, conditions are reversed.

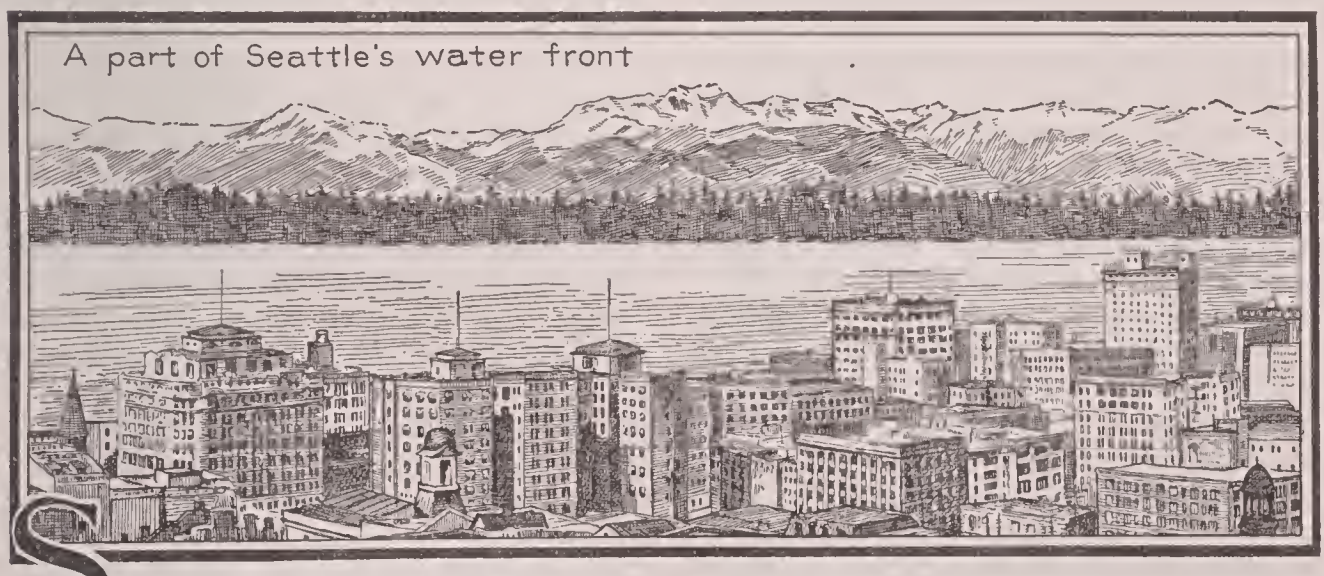
The four seasons are noticeable generally in the temperate zones, but in the torrid zone there is usually only a wet and a dry season. The polar regions, too, have only two seasons, winter and summer. Ordinarily in the northern hemisphere the months of March, April and May are called the spring months; June, July and August, the summer; September, October and November, the autumn; and December, January and February, the winter months. In the southern hemisphere the seasons are reversed, spring beginning in September, summer in December, autumn in March and winter in June.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Astronomy | Equinox |
| Earth | Solstice |

**SEA SQUIRTS,** *skwurts,* or **ASCIDIANS,** *a sid' i anz,* a group of mollusks of a low order, so called because they have the habit of squirting out jets of water when irritated. The young of these animals resemble the tadpole of a frog and are free-swimming; the adults have leathery, bottle-shaped bodies and remain through life attached to stones, shells, wharves and other fixed objects. The mature form is simpler in structure than the tadpole.

SEA SQUIRTS




**SEATTLE,** *se at' 'l,* WASH., the largest city of the Pacific Northwest, the county seat of King County and one of the most important seaports on the Pacific coast of America, is situated on the east shore of Puget Sound, 864 miles by water north of San Francisco and 185 miles by rail north of Portland, Ore. The Canadian boundary is 125 miles to the north.

**General Description.** Seattle occupies a beautiful site, with the snow-capped Olympic Mountains and Puget Sound on the west and Lake Washington and the Cascade Range on the east. Lake Washington, twenty-two miles long and four miles wide, is connected with Puget Sound by a ship canal over eight miles long. The canal passes through Lake Union, in the north-central part of the city, and connects with the Sound by means of a large lock, made necessary by the difference in levels between the bodies of salt and fresh water. The completion of this canal greatly extended the city's water front. The site is hilly, and some parts of the city have an altitude of 500 feet. Many streets extending east and west traverse steep slopes, but by means of cable cars the inhabitants travel them with ease. In three localities where these elevations offered the greatest obstacles to the city's progress they were removed. Jackson Street was lowered 124 feet below its highest point; Denny Hill was lowered 130 feet,

and a section of Third Avenue was also graded down. The earth removed was used in filling depressions. This regrading required the removal of 11,750,000 cubic yards of earth and cost the city $3,500,000, but it transformed three practically inaccessible hills into valuable business centers.

The city is attractively laid out. The streets are broad and straight, and with few exceptions they cross at right angles. Most of the streets extend approximately north and south and east and west. The wholesale and manufacturing district borders on Puget Sound, and the water front has ample dock facilities for the ocean-going vessels that frequent the port. Adjoining this district and on slightly higher ground is the business center, characterized by many substantial structures of steel and concrete and not excelled by those of any other city. The residential districts are on the higher elevations, and many slopes are adorned with beautiful homes surrounded by lawns and gardens. An excellent street railway system connects all parts of the city and the adjoining suburbs, and two interurban lines extend to important towns in the surrounding country.

**Parks and Boulevards.** The parks and boulevards are unusually complete for a city of the age and size of Seattle. There are 1,815 acres under the jurisdiction of the park commissioners, including forty-four improved parks and twenty-four equipped and supervised playgrounds. There is a well-equipped municipal beach and pavilion at Alki Point, and municipal golf links are maintained at Jefferson Park. Seward Park is on Lake Washington. A zoölogical garden is located in Woodland Park, which also has an athletic field, picnic grounds and bathing and boating facilities. Ravenna is noted for its large trees, mineral springs and beautiful cascades. Volunteer Park, on Capitol Hill, overlooks both Puget Sound and Lake Washington and contains the municipal conservatory and a statue of William Henry Seward. The campus of the University of Washington, with an area of 355 acres, is noted for its beautiful gardens. All these parks are connected by boulevards and winding drives. The boulevard system is about fifty miles in extent and touches all the more sightly elevations in and about the city.

**Buildings.** Among the most attractive church edifices are Saint James Cathedral, the First Presbyterian, First Baptist Church and the First Church of Christ Scientist. The most noted business or office buildings are the L. C. Smith Building (forty-two stories), the highest office building in America outside of New York City; the Metropolitan Building, and the Hoge, Alaska and Cobb buildings. Among the public buildings of note are the city and county building, the King Street passenger station, the O.-W. and Milwaukee station, Washington Hotel and Providence Hospital. The Metropolitan, Moore, Pantages, Wilkes and Orpheum are the leading theaters. The Arctic, Sunset and Rainier clubs are each housed in beautiful and commodious structures.

**Manufactures.** Inexpensive water power and electric power obtained from plants in the surrounding country have made Seattle the most important manufacturing center in the northwestern part of the United States. The manufacture of lumber and lumber products is the leading industry of Western Washington, and shipbuilding that of Seattle. The fisheries of Alaska and Puget Sound are centralized in Seattle, and it is estimated that 100,000 tons of fish and fish products are handled each year. More than $7,000,000 worth of salmon, halibut and cod are packed or shipped in ice, and large quantities of salmon are canned here. Slaughtering and meat packing, the manufacture of flour, printing and publishing, and the manufacture of machinery are among the other leading industries. Port Blakeley's lumber mills are the largest in the world.

**Transportation and Commerce.** Seattle is the terminus of eight transcontinental lines of railway, four of which—the Great Northern, the Northern Pacific, the Chicago, Milwaukee & Saint Paul and the Union Pacific—enter the city over their own tracks. The Southern Pacific and the Chicago, Burlington & Quincy have traffic arrangements with other lines, and the Canadian Pacific and Grand Trunk Pacific have steamship connection. Elliott Bay, the central harbor of Seattle, is one of the best land-locked harbors in the world. Owing to its northern location, the routes between Seattle and the ports of China and Japan are shorter than those between the Orient and any other port in the United States, and this advantage has made Seattle one of the leading seaports of the country. Large quantities of silk, tea and other commodities entering the United States from the Orient pass through the city. Seattle is the headquarters for trade with Alaska, and the trade with the surrounding country is also important. The Assay Office here handles all the gold that comes from Alaska and the Yukon region.

**Education.** The public schools are under control of a board of education which is independent of the municipal government. The University of Washington, under the management of the state, is the largest institution for higher education in the Pacific Northwest (see WASHINGTON, UNIVERSITY OF). Washington Preparatory School for Girls, the Academy of the Holy Name, the College of Our Lady of Lourdes, Adelphia College and Seattle College are all schools of a high order of excellence. The public library maintains nine branches and has over 265,000 volumes.

**Institutions.** Seattle contains a number of hospitals, chief among which are the Municipal Hospital, maintained by the city; the County Hospital, in charge of the county commissioners, and the Swedish, Seattle General, Miner and Providence hospitals. There are a number of benevolent societies in the city and the usual church organizations for charitable work.

**Growth.** Seattle has had a rapid but a substantial growth. In 1880 the population was only 3,500; in 1890 it was 42,837; in 1900, 80,871; in 1910, 237,194, and in 1916, 348,639 (Federal estimate). A very large part of the population has come from the eastern and central parts of the United States.

**History.** The site of Seattle was undoubtedly once well known to the Indians of the Northwest. The first white settlement was made in 1852. Four years later it survived an attack by Indians, was incorporated as a town in 1865 and as a city in 1869. The first railroad from the East was completed in 1884. In 1889 the city suffered from a disastrous fire. This and the financial depression of 1893 delayed its development. In 1897 gold was discovered in Alaska and the Yukon region, and Seattle immediately became the outfitting point of this great field.

In 1909 the Alaska-Yukon-Pacific Exposition (which see) was held in Seattle for the purpose of exhibiting the resources of that region. At the close of the exposition a number of the principal buildings became the property of the University of Washington. P.N.

Consult Beaton's *A City that Made Itself.*

**SEA UR'CHIN,** an animal belonging to the same group as the starfishes, sea lilies and sea cucumbers (see ECHINODERMS), the body of which is covered with tiny limestone plates bearing hinged spines. "Without its spines," says one authority, "a sea urchin looks like an old-fashioned door knob." On its lower surface the sea urchin has a circular opening containing the mouth; on the upper surface are the eyes and the openings through which the eggs emerge. Through tiny holes in the body covering the animal thrusts out tube feet having sucking disks. With these suckers it draws small animals into its large mouth, which has five sharp teeth for grinding the food. The tube feet are used also as organs of locomotion, and some of them are employed as feeling tentacles. The various species are found in shallow water in most parts of the world. In the Mediterranean Sea there is a large species used as food. A sea urchin found on the California coast can burrow holes into solid rock. These animals all reproduce by eggs.

SEA URCHIN

**SEA'WEED,** any plant that grows in the sea. There are numerous varieties of seaweed and several of them are useful. For instance, blanc-mange, a popular dessert, is prepared from Irish moss, or carrageen, which is also a valuable cattle food. Eel grass is employed in upholstering; the ash obtained by burning kelp is an important source of iodine, and the plant when dried and ground makes a valuable fertilizer, since it contains a large percentage of potash. Seaweed collects in large masses in those parts of the ocean that are free from currents. On account of its bulk and weight it cannot be transported far with profit, but large masses frequently drift near the shore, where they become available. Accumulations of this sort are found near the Philippine Islands and in several places off the Atlantic and Pacific coasts of the United States.

**Related Subjects.** For further information on this subject the reader should consult the following articles:

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|---|---|
| Algae | Kelp |
| Ash | Sargasso Sea |
| Irish Moss | Water Plants |

**SEBASTIAN,** *se bas'chan,* SAINT, one of the early defenders of the Christian faith, who was put to death by the Emperor Diocletian. He entered the Roman army without revealing his intent to assist and protect the Christians, found favor with the emperor and became commander of the first cohort at Milan. His re-

ligious faith having been discovered, he was condemned to death, tied to a tree and shot with arrows by a troop of archers. He was left as dead, but life was not extinct, and he was cared for in the home of a Christian lady named Irene. After his recovery he again publicly professed his faith. Thereupon the emperor ordered him to be beaten to death with clubs, in the amphitheater. He was buried in the catacombs. The martyrdom of Saint Sebastian was a favorite subject of the early Italian painters.

**SEBASTOPOL,** *se bas' to pohl,* a fortified Russian city on an inlet of the Black Sea, famous as the scene of one of the greatest sieges in history (see subhead *Crimean War,* in article CRIMEA). Sebastopol is situated in the southwestern part of the Crimean peninsula, on a magnificent harbor that has become the most important naval station in Southern Russia. Since the close of the Crimean War, in 1856, the city has been practically rebuilt, and now contains handsome cathedrals, two museums, extensive docks and several monuments in commemoration of the war. The principal industrial establishments are the shipbuilding yards. This city was bombarded by the Turks in the War of the Nations. Population in 1913, 77,000.

**SECESSION,** *se sesh' un,* WAR OF. See WAR OF SECESSION.

**SECORD,** *se' kawrd,* LAURA, a Canadian heroine, whose courage gave the British a victory in the Battle of Beaver Dam, during the War of 1812. It was in 1813, in the midst of the Niagara campaign, that Mrs. Secord performed the feat which made her famous. The British forces had been retiring before the enemy until Sir John Harvey checked the American advance at Stoney Creek. As a result of Harvey's victory the British stationed a force of about fifty regulars and 500 Mohawk Indians at Beaver Dam, about half way between Stoney Creek and the Niagara River.

The Americans planned to surprise and capture this force at Beaver Dam. Secord, a wounded militia officer who was then living at Queenston, overheard several Americans discussing these plans. He himself was unable to warn the force at the Dam, but his wife, Laura Secord, undertook the errand. Driving a cow before her until she reached the woods, in order to avoid suspicion, she then set forth on a tramp of twenty miles, through dense forests, in constant danger from lurking Indians or from Americans. It was an all-day tramp, and Mrs. Secord was quite exhausted when she finally gave the warning to the British commander. When the Americans then advanced to the attack, the British and their Indian allies were ready, and started such a fierce fire that the American commander thought himself surrounded by a large force and surrendered.

A MEMORIAL
"To perpetuate the name and fame of Laura Secord."

This victory did not involve large forces, but it gave the Canadians much encouragement. Mrs. Secord became famous in a day. After the close of the war she lived quietly for many years in a little cottage at Niagara which is still pointed out to visitors.

**SECRETARY,** *sek' re ta ri,* **BIRD,** a falcon-like bird of large size, about four feet long, found in South Africa. It takes its name from the tufts of feathers that project from the sides and back of its head, giving it a resemblance to a clerk, or secretary, with quill pens behind his ears. It has very long legs and tail, and ordinarily it prefers to run rather than to fly.

SECRETARY BIRD

Its food includes frogs, insects, lizards, small tortoises and snakes. The latter it strikes with its wings or feet, or perhaps it flies with its victim high in the air and kills it by letting it fall to the ground. In Cape Colony a fine is imposed for killing the bird, because of its destruction of snakes. It builds a bulky nest, in a tree or bush The eggs, two or three in number, are a dull white, spotted with rust color.

The South African farmers sometimes tame secretary birds and keep them about their buildings to destroy the vermin, but unless they are well fed they are likely to kill and eat the poultry.

**SECRETION,** *se kre'shun,* in physiology, is the process by which various glands or membranes of the body separate certain materials from the blood and form them into new fluids. These fluids are called *secretions.* Examples are bile, secreted by the liver; gastric juice, made by digestive glands; saliva, poured from the salivary glands; and the lubricating fluid (synovia) which keeps the joint surfaces working smoothly. The fluids mentioned are known as *true secretions,* because they each have a special work to do. There are other fluids, known as *excretions,* which are separated from the blood, but these differ from true secretions in that they are discharged from the body as waste matter and in that they are abstracted in the form in which they are found in the blood. Examples of excretions are urine and perspiration.

**Related Subjects.** The following articles may profitably be read in connection with this subject:

| | |
|---|---|
| Bile | Mucus |
| Digestion | Pancreas |
| Kidneys | Perspiration |
| Liver | Saliva |
| Membranes | Urine |

**SECRET SERVICE,** *se'kret ser'vis,* the organized system of secret espionage, or active surveillance, which is established by a government for its protection against violation of national law and against enemies at home and abroad. The officials work in secret, and certain sums of money are placed at their disposal, for which they are required to render only a private account to their superiors.

Such a bureau was established by the United States government in 1860, primarily to detect and arrest counterfeiters of its currency. During the War of Secession its operatives were loaned to the War Department in connection with military movements, and they performed efficient service in obtaining information relating to the enemy. Inasmuch as the office was intended from the beginning to war on counterfeiters, it was made a bureau of the Treasury Department and has always remained as such. However, other departments of the government are free to call on the Treasury officials for secret-service operatives.

The bureau is presided over by a chief, whose office is in Washington; there are twenty-eight branch offices in various cities of the country, each in charge of a chief operative. There are hundreds of operatives in the service, and because of the secrecy necessary to the successful operation of the bureau few of these are known to each other.

At no other period in the world's history did the various nations make such extended use of their respective secret-service departments as in the War of the Nations. The ramifications of the German service extended to all parts of the globe, and so efficient was the system developed that the Imperial government obtained the most carefully-guarded news even from countries with which Germany was at war. The United States secret service, after America's entrance into the war, was called upon to perform a gigantic task, for the vast extent of country and diversity of nationalities made possible endless forms of plotting against the government. The utmost ingenuity of the British service was demanded to cope with the German intrigue, and then not always with success.

**SECRET SOCIETIES.** See FRATERNAL SOCIETIES.

**SEDALIA,** *se da'li a,* Mo., a railroading and manufacturing center and the county seat of Pettis County, situated in the west-central part of the state, 188 miles west of Saint Louis. It is on the Missouri Pacific and the Missouri, Kansas & Texas railroads, both of which have large shops here. In 1910 the population was 17,822; it was 19,449 (Federal estimate) in 1916. The area exceeds six square miles.

Sedalia has the George R. Smith College (colored), the Convent School of the Sisters of Saint Joseph, a Federal building erected in 1896 at a cost of $70,000, a county courthouse, Convention Hall, Y. M. C. A. building, Carnegie Library, two hospitals and Liberty Park (forty-six acres). The Missouri State Board of Agriculture conducts an annual state fair in grounds near the city. The industrial establishments include railroad car shops, a meat-packing plant, a candy factory, large clothing factories

and manufactories of farming implements and carriages. Here, also, is a large horse and mule market. Sedalia was founded by General G. R. Smith in 1861.

**SEDAN,** *se dan',* Battle of, a decisive engagement of the Franco-German War, fought on September 1, 1870, at the fortified town of Sedan, 164 miles northeast of Paris. About 17,000 of the French army, under Marshal MacMahon, were killed or wounded, and on September 2 nearly 2,900 officers and 83,000 privates, together with Emperor Napoleon III, surrendered to the Germans. When the news reached Paris that Sedan had fallen, the Second Empire was overthrown and a republic was established. For events preceding the battle, see Franco-German War.

**SEDATIVE,** *sed'a tiv,* a drug, taken internally or applied externally, which exerts a soothing influence on any part of the organism by numbing the senses or lowering activity. Sedatives vary in their effects; the same one may soothe one part and excite another, and one administered in small quantities may alleviate pain and in large quantities may irritate. Again, a hot poultice may act as a sedative in one part of the body and an ice pack have the same effect on another part. Drugs, heat, cold and friction are all sedative agents of varying degrees of effectiveness.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Anesthetic | Medicine and Drugs |
| Disease | Narcotic |

**SEDGE,** the name of a large family of plants closely resembling the grasses and found growing in clumps in damp places in almost all parts of the world. In the sedges the sheath which enfolds the stem is entirely closed, and the stems, often triangular, are usually solid; but the grasses almost always have the stem sheath split on one side, and this difference is sometimes the only feature by which the average nature lover can tell the two apart. The spikelets of sedge flowers are small, each floweret being enclosed by one scale instead of by several, as in the grasses. The tubers of some species are good to eat; from the fragrant roots of others perfumes are made; while the Egyptian papyrus, another variety, had many important uses. See Papyrus.

**SEED'ER.** See Sowing Machine.

**SEEDS.** The plant grows to bear a flower, and the flower blooms to produce a fruit. The chief part of the fruit in respect to the plant is the seed, for it is that part from which another plant grows. Seeds are sometimes called "plant babies," because within each seed is a tiny plant waiting to grow.

"First a seed so tiny
Hidden from the sight,
Then two pretty leaflets
Struggling toward the light;
Soon a bud appearing
Turns into a flower,
Kissed by golden sunshine,
Washed by silver shower."

**Parts of a Seed.** The parts of a seed are the tiny plant, or embryo, the food for the embryo and the seed coat. The coat may be thin and smooth, as in the bean, or thick, rough and hard, as in the peach pit. The food for the embryo, which consists chiefly of starch and albumen, is stored around the embryo, as in the bean and the corn, or it may be almost entirely absorbed by the embryo, which nearly fills the space enclosed by the seed coat. This is usually the plan in small seeds. In Fig. 1, *a, b, d* and *e* show these parts of the seed. In *a* the embryo is in the center of the lower part of the seed; *d* represents a bean, in which the embryo can be seen by soaking a large bean in water for a few hours, then opening it, as shown in the cut. A study of Fig. 2 shows other seeds in which the position and shape of the embryo may be distinctly seen. A study of these illustrations shows that no two plants have seeds exactly alike.

The food for the embryo is stored in the seed on three general plans, and botanists have divided all flowering plants into three great

divisions in accordance with these plans. When a bean or a squash seed germinates, two thick leaves shaped like the halves of the seed are the first objects to appear above the ground. Between them we see the tiny plant ready to put forth its leaves. The two thick leaves contain the food for the embryo, and when the food has been absorbed by the growing plant-

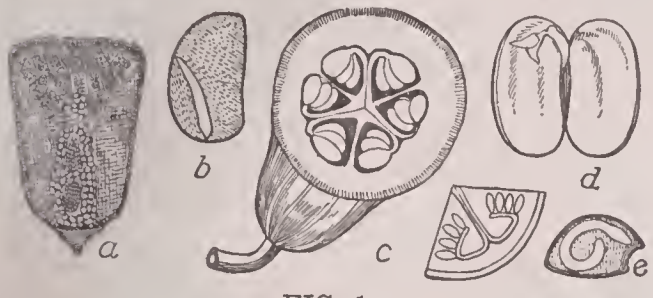



FIG. 1

(*a*) Cross section of a grain of corn; (*b*) cross section of asparagus seed; (*c*) cross section of squash and one carpel; (*d*) common bean, split open; (*e*) cross section of onion seed.

let they wither and fall. They are known as *seed leaves,* or *cotyledons,* a name which comes from a Greek word meaning *hollow* or *cuplike.*

When corn germinates no seed leaves appear above the ground, the first leaf being the tiny shoot which unfolds into the young corn plant. If we look at the kernel of corn (*a,* Fig. 1), we see that the embryo is surrounded by plant food upon all sides. We cannot divide the corn into halves as we can the bean, because this food is all stored in one mass. That is, the corn has only one seed leaf, or cotyledon. All plants having seeds with only one cotyledon are called *monocotyledonous* plants. Corn, wheat, oats, barley and grasses are good examples of plants belonging to this division.

We have seen that the bean and squash produce seeds with two seed leaves. All plants

FIG. 2

(*a*) Lengthwise section of a pansy seed; (*b*) lengthwise section of a buttercup seed; (*c*) capsule of violet, split open, showing seeds attached to placentae; (*d*) cross section of iris capsule; (*e*) lengthwise section of poppy seed.

with seeds having two seed leaves are called *dicotyledonous* plants. The maple, elm, oak, alfalfa and clover, besides the other plants named, are good examples of this division. Cone-bearing trees produce seeds with more than two seed leaves and form the division of *polycotyledonous* plants. One needs to know the meaning of these terms because they are frequently met with in reading botanical descriptions of plants.

A study of the arrangement of seeds in the seed vessel or fruit leads to some of the most curious and interesting facts connected with the study of plants. How many can tell the direction in which the seeds of the apple point? (See *a,* Fig. 3.) Does the pit of the peach point in the same direction? (See *e,* Fig. 3.) Notice how the seeds are arranged in the squash (*c,* Fig. 1); in the iris (*d,* Fig. 2), and in the cranberry (*d,* Fig. 3). In the blackberry (*c,* Fig. 3), they are attached to the outside of a fleshy receptacle, but each seed is enclosed in a little, pulpy fruit. In the strawberry the seed is on the outside of the fleshy receptacle. Notice the ingenious method by which the seeds are packed into these capsules or pods. By no other arrangement could the same number of

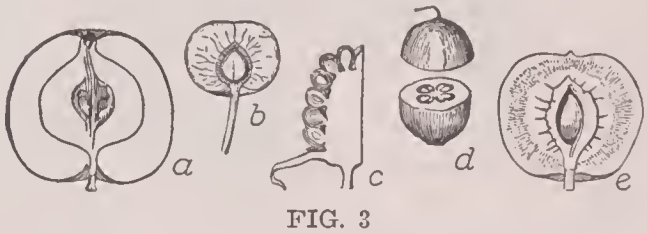



FIG. 3

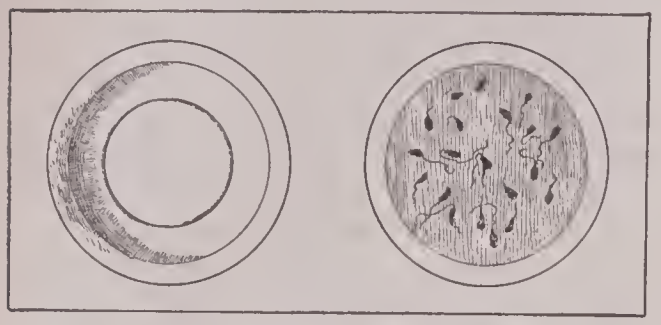
(*a*) Lengthwise section of apple, showing position of seeds in center; (*b*) lengthwise section of cherry, with seed in center; (*c*) lengthwise section of part of blackberry; (*d*) cross section of cranberry; (*e*) lengthwise section of peach, showing seed in center.

seeds be crowded into the space. Make a collection of seed vessels before they open and observe the arrangement of the seeds in each.

**Seed Adulteration.** The seeds of some cultivated plants so closely resemble those of worthless plants that these seeds may be mixed and no one but an expert can detect the fraud. To illustrate, the seeds of pepper grass, dodder, crab grass and sorrel may be mixed with timothy seed, and kale and mustard may be mixed with turnip seed. It is difficult to obtain pure seed for planting because weeds grow with the crop and are necessarily harvested with it. While most of the weed seeds are separated from the grain at threshing, some remain, and if sowed the next season they produce another crop of weeds. A large number of fanning mills have been invented for the purpose of enabling the farmer to obtain pure seed for planting.

**Seed Testing.** The importance of securing a good crop makes it advisable for the farmer to test his seed before planting. A simple device consists of two plates of the same size. Lay a piece of blotting paper in one plate, first marking it off into squares two inches in diame-

ter. Pour enough water into the plate to moisten the paper and then lay ten seeds to be tested in each square. Cover them with another piece of blotting paper or with a damp cloth, and cover this by turning the second plate over the first. Keep the blotter moist and set the plates where the temperature will be about the same as that of the soil at the time of planting. In eight or ten days the seed



SEED TESTING
A simple device for testing seeds in sand.

should have germinated (sprouted). Count the number of seeds in each square that have germinated, and you have the percentage of good seed in the lot from which the seeds were taken.

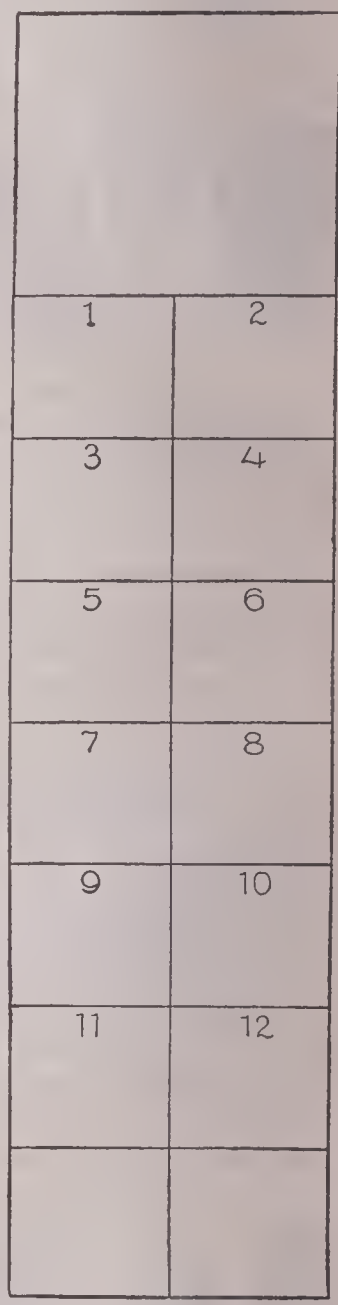
A strip of muslin, nine inches wide and a yard long, marked as shown in the cut, is convenient for testing seed corn. Test as many ears as there are squares on the cloth, numbering each ear to correspond with the square in which kernels taken from it are placed. Place a round stick on the blank end of the cloth and roll it up lightly, taking care not to disturb the kernels. Tie the roll loosely and place it in water over night, then bury in damp sawdust or sand and keep it at a temperature of 65° or 70° until the corn germinates. A box of sand marked off into squares by strings or wires is more convenient for testing a large quantity of seeds.

**Use of Seeds.** The purpose of the seed in nature is to reproduce the plant, and almost every plant produces a large number of seeds, but only a part of these grow. Some are eaten by birds and animals, some are destroyed by fire and other agencies, and some fall upon rocks or in water where they cannot germinate. But the greatest use of seeds is for food for man and domestic animals. By far the greater part of the food of all the people in the world consists of seeds. In America and Europe wheat, corn, rye, oats and barley are the grains most extensively grown for food. In Asia rice is the chief article of food; hence the world over, growing seeds (grain) is the chief occupation of the agriculturist. W.F.R.

Consult United States Department of Agriculture's *Year Books,* issued annually.

**Related Subjects.** The reader is referred to the articles on the various plants mentioned above, and to the following articles in addition:

Angiosperms
Botany
Cotyledon
Cross-Fertilization
Flowers
Fruit
Germination
Grains
Gymnosperms
Plant
Pollen and Pollination
Spore




SEED TESTING
How cloth is marked.

## *Seed Dispersal*

The fruits of many plants are constructed for the special purpose of scattering the seeds or to aid in their dispersal by wind, water and animals. The seeds themselves are fitted for long journeys and can withstand conditions that would kill most plants. Some seeds remain in good condition for long periods of time, and grain has even been grown from the seeds found in ancient Egyptian mummy cases, where it has lain for thousands of years.

The seeds of wild plants are sown in unimaginable numbers by natural agencies, each year making good the loss of vegetation due to all destructive causes. Owing to the lack of sufficiently thorough and rapid distribution, insect and plant enemies and unfavorable conditions, only a small proportion of the seeds produce new plants. When ripe, many seeds detach themselves from the fruit; others, by various devices of nature and by atmospheric

SOME OF NATURE'S MEANS OF SEED DISPERSAL

(*a*) Winged seed of the maple; (*b*) burs of "sticktights;" (*c*) seeds of Spanish needles; (*d*) dandelion seeds; (*e*) burdock seeds; (*f*) winged fruits (seeds) of American elm; (*g*) tumbleweeds blown by the wind.

conditions, are brought from their shelter at the proper time.

**Dispersal by Wind.** The wind is the chief agent in scattering seeds. Some dustlike seeds, like those of the orchid, float in the air, and others are provided with downy, tufted parachutes or wings. The tufted seeds of the thistle and dandelion and those imbedded in soft wool and silken hair, such as the cotton, poplar and milkweed seeds, are detached from their beds by the dry winds and warm sun and are blown long distances. The seeds of the maple, elm and ailanthus are equipped with membranous wings, and in others the fanlike petals of the dry calyx form the sails or parachutes which carry them to distant places. The wings and parachutes of some seeds become detached after the journey through the air; others remain on the seed and serve to fasten it in some favorable place for germination.

Whole clusters of fruits containing seeds, such as the white pine cone, are also blown from place to place. The smooth, light fruits of tropical plants, like the "steppe witches," are rolled for miles over the level, barren steppes until they fall into some crack in the clay or are lodged in a hole, where the seed germinates and produces a new plant. In such plants as the tumbleweed, the stalk parts from the roots when the seeds are ripe, and as the plant is blown from place to place it scatters its thousands of seeds.

Perhaps the most curious and interesting natural seed scatterers are the "sling fruits" and "catapult fruits." In the former the tissues around the ripened seeds become highly tense and burst their outer covering, which then contracts with a violent jerk, forcibly expelling the seeds as from a sling. In some plants the seeds are expelled by the drying up of the pod or the spiral twisting of the valves of the fruit. The catapult fruits, such as the light pods of the poppy and morning glory, are open at the top, and when the stalks are bent or swayed to and fro they rebound, flinging the seeds in all directions from the top of the pod.

**Dispersal by Water.** Water and moisture are also important agents in the dispersal of seeds. Water plants, such as the lotus and also some varieties of palms, have floating seeds contain-

ing air which buoys them up to the surface, and after floating for months they will germinate when lodged in the soil. It is believed that the uninhabited islands of the South Seas in this way have been planted with cocoa palms.

The roses of Jericho scatter their seeds, not when the winds are dry, but in moisture and rain. The tightly curled fruits are untwisted and opened by dampness; the seeds are then washed out by the rain. The capsules of the ice plants are similarly opened by the rain, and another interesting action of moisture in the distribution of seeds is seen in the hopping or creeping fruits of the plants of the hot plains. These fruits have a stiff bristle projecting from one side, which changes its position with atmospheric changes, thus propelling the fruit by causing it to hop or spring along the ground.

**Dispersal by Animals.** Other seeds are designed to be carried by animals. The fruits are provided with sharp spikes, hooks or claws which catch in the animal's fur or man's clothing. These burs are sometimes like the catapult fruits thrown at the passing animal by the swaying plant. The stalks of some plants are claws, and, carrying the seed with them, cling to any rough surface with which they come in contact.

The seeds of edible fruits also are widely scattered by man and animals. The fruits of the wild cherry, currant and raspberry are often carried long distances by birds. They are then eaten, and the seed either dropped to the ground or later expelled from the crop. This explains how wild cherry and apple trees spring up in woods and meadows and how bittersweet and berry bushes come to grow in the forks of trees. Migratory birds carry seeds in the mud which clings to their claws when they are startled into flight. Nuts are carried to new places by squirrels and other animals, which bury them and often leave them to germinate the following spring.

Even if wind and water fail in effecting a wide dispersal, seeds are always scattered within short distances, thus insuring the perpetuity of the plant. So wonderfully constructed are a few plants that if pollination does not take place and the flowers produce no seeds, fruits producing seeds which germinate are formed underground and a new plant springs up in the place occupied by the old plant in the preceding year. E.B.P.

Consult Beal's *Seed Dispersal;* Morley's *Seed-Babies.*

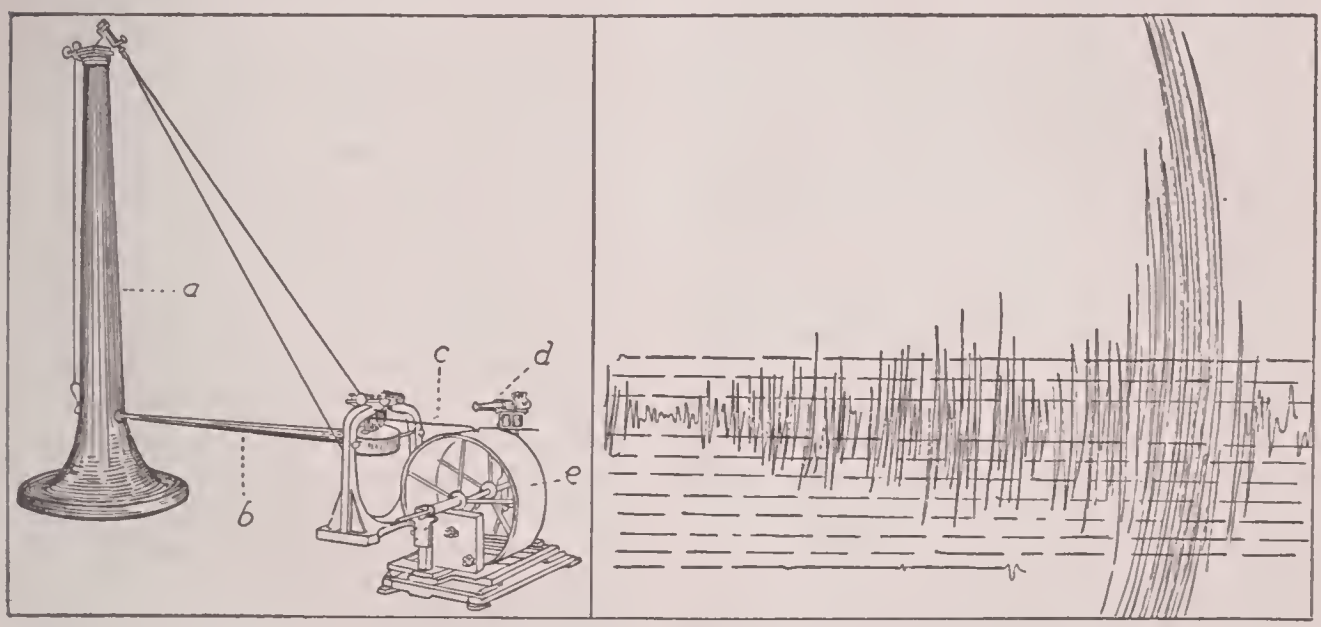
**SEE'LAND.** See ZEALAND.

**SEIDL,** *zi'd'l,* ANTON (1850-1898), an Hungarian musical conductor, born at Budapest, was trained in the Leipzig Conservatory. At the age of twenty-two he was considered such an accurate musician that Wagner called him to Bayreuth, Germany, to be one of his copyists. Seidl became an intense admirer of Wagner and assisted in the first of the famous Bayreuth Festivals in 1876. A little later the composer recommended him as conductor of the Stadt theater of Leipzig, and there until 1882 he brought forth the greater German operas in a manner that won him fame. In June, 1882, he presented Wagner's *Trilogy* in London and roused to enthusiasm an audience previously rather indifferent to Wagnerian work. In 1885 he succeeded Leopold Damrosch as conductor of German opera in New York and during that year his orchestra attained such fame that he could fill only a small portion of the engagements offered. He became a conductor at Bayreuth in 1896, but soon returned to New York, where he died on March 28, 1898.

**SEIDLITZ POWDERS,** *sed'lits pou'derz,* a laxative, fizzing preparation, consisting of two separate powders which are taken together. They are usually put up in blue and white papers, the blue containing tartrate of soda and potash (Rochelle salts) with bicarbonate of soda, the white one containing tartaric acid. The powders are dissolved separately in two half-filled tumblers of water, and one solution is then poured into the other. Effervescence begins immediately, and the draught should be taken at once. The powders give better effects when taken on an empty stomach; they produce a gentle, relieving action of the bowels. The name comes from that of a town in Bohemia, where a mineral water with similar effects is found.

**SEIGNIORIAL TENURE,** *se nyo'ri al ten' ure,* a system of feudal tenure of land which prevailed in Quebec for nearly two centuries. It was instituted by the great Cardinal Richelieu, who patterned it after the French feudal system. Large grants of land, called *seigniories,* were bestowed upon men of high position. These *seigneurs,* or *seigniors,* granted parcels of land to *censitaires,* who in turn bestowed smaller grants upon the *habitants* (see CANADA, page 1122). Each of these classes of grantees paid rentals or fees and sometimes even personal services to the overlords. So long as population was sparse, there was little complaint, but gradually there arose great discon-

tent among the tillers of the soil over the fact that they could not own the land. Some seigneurs and censitaires, moreover, took all they could get from the habitant, whose life was often a hard one. The system of seigniorial tenure was always an obstacle to the development of an independent farming class. Especially after the beginning of the nineteenth century the agitation for its abolition grew in force. For half a century it was the chief political issue, aside from the demand for responsible government, in Lower Canada. Finally, in 1854, seigniorial tenure was abolished by the McNab-Morin ministry. The seigneurs were recompensed for the surrender of their rights, almost the entire expense being borne by the government.




THE SEISMOGRAPH AND ITS RECORD

The instrument is described as follows: (*a*) support; (*b*) pendulum; (*c*) recording lever; (*d*) electric time marker; (*e*) record cylinder. At the right is a picture of a record cylinder which has recorded an unusual disturbance somewhere on the earth's surface. The delicate adjustment of the instrument makes possible a record of the smallest tremor as well as of a severe quake.

**SEINE** (in English, *sayn*) is the river in France upon whose banks lies the city of Paris. As a trade route the Seine is first among the rivers of France, for in normal years it carries over 10,000,000 tons of freight for Paris alone. Rising in the department of Côte-d'Or, at an elevation of 1,500 feet above the sea, it flows with many windings in a northwesterly direction, dividing Paris into two parts and finding an outlet in the English Channel 250 miles in a direct line from its source. Because of its many curves, the river is actually 472 miles in length.

Its mouth is a spacious estuary, on which is situated the city of Havre. Large sums of money have been spent to enhance the commercial value of the Seine. Locks have been constructed between Paris and Rouen, a canal runs parallel with the river between Marcilly and Troyes, and the stream has connections with the Loire, the Rhone, the Rhine, the Meuse and the Scheldt by means of canals and its tributaries. Of the latter the most important are the Oise and the Meuse. There is also a canal skirting the north shore of the estuary, between Havre and Tancarville. The Seine at times overflows its banks, and Paris has on several occasions suffered from floods. One occurring in January, 1910, caused great damage to property.

**SEISMOGRAPH,** *sys'mo graf,* a word derived from the Greek *seismos,* meaning *an earthquake,* and *graphein,* meaning *to write.* The term is applied to a machine which "writes about" or records the occurrence of an earthquake and indicates its force and direction. It is unfailing in announcing such a disturbance, but of course gives no hint as to the section affected except from the violence of the recorded movement the possible distance away can sometimes be inferred with considerable accuracy.

The most efficient form of seismograph consists of a delicately-suspended pendulum which remains stationary while the earth's crust is moved even very slightly by earthquake shocks. A pen or pointed instrument is attached to the pendulum and records on smoked glass the movements of the earth. A highly sensitive seismograph is produced by suspending a non-magnetic needle by means of silk or quartz

fiber. A point of light is reflected from the needle on photographic paper, black, zigzag lines appearing when the photograph is developed. Modern seismographs are so delicately adjusted that scientists in any part of the world are able to study and record earthquakes occurring at any other point on the globe. Quite often shocks are recorded of which the world never hears particulars; such occur in islands remote from civilization or under water near coasts. See EARTHQUAKE; VOLCANO.

Consult Milne's *Earthquakes and Other Earth Movements;* Dutton's *Earthquakes in the Light of the New Seismology.*

**SE'LAH,** a Hebrew word of uncertain origin occurring seventy-one times in the *Psalms,* as well as in *Habakkuk* III, 3, 9 and 13, and retained in the English authorized version of the Bible. It is supposed to indicate a pause or natural break in a hymn. One authority has suggested that it is a direction to the singers to "lift up their voices."

**SELECT'MEN,** the chief executive officers of the New England town, corresponding to aldermen of a city or councilmen of a village. They are usually elected annually and serve for one year, although in Massachusetts they are elected for three years, one being chosen each year. The number of selectmen varies from three to nine, according to the population, but the usual number is three.

The selectmen compose the administrative board of the town and put into effect the instructions they receive from the town meeting. They conduct the more general affairs of the town, as minor officers are elected for specific duties. They have limited appointive powers and may fill vacancies in town offices. They are sometimes paid salaries, but more often receive only the equivalent of the expenses of the office. The name is not employed in any state west of New England, nor in any other country than the United States.

**SELF-DENY'ING ORDINANCE,** *awr'di nans,* an enactment passed by the British Parliament in 1645 which required all members of that body to resign who held any civil or military office during the civil war between Charles I and Parliament. The ordinance was named from the remark made by Cromwell that "all Parliament members should deny themselves and their private interests for the public good." This measure had a twofold object: first, the removal of inefficient commanders, and the substitution of vigorous men that the times demanded for the remodeled army; second, to give the control of the army to the radical Independents, rather than to the Presbyterians. The lords finally passed the measure, with alterations, after a new army had been formed by the commons with Cromwell as lieutenant-general of the cavalry and Sir Thomas Fairfax general-in-chief. Cromwell was made an exception to the new ruling. See CROMWELL, OLIVER.

**SELJUKS,** *sel jooks',* the Turkish dynasty with which the nations of Christian Europe came into conflict during the period of the Crusades. The cruel treatment of Christian pilgrims on the part of the Seljuks is described in these volumes under the heading CRUSADES. This dynasty established itself in Syria and Asia Minor in the latter part of the eleventh century, setting up several independent sultanates. The last of these sovereignties endured until the close of the thirteenth century, and out of its ruins the present Ottoman Empire rose. It was during the period of Seljuk supremacy that Omar Khayyam (which see) lived. See TURKEY, subtitle *History.*

**SEL'KIRK,** a town in Southern Manitoba, on the Red River, near its mouth. It is twenty-four miles north of Winnipeg, with which it is connected by an electric line and by a branch of the Canadian Pacific Railway. Selkirk is at the head of navigation for steamers on Lake Winnipeg, and is the center of the fishing industry on the lake. It is estimated that about 7,000,000 pounds of fish are shipped from Selkirk each year. In addition to several large cold-storage plants, the chief industrial establishments are a saw and planing mill, box factory, pulp and paper mill, iron rolling mills and a nut and bolt factory. The government maintains a shipyard and dry dock. The Selkirk district is famous for the fertility of its soil, and because of its proximity to Winnipeg is admirably suited to dairying and the cultivation of fruits and vegetables. Population in 1911, 2,977; in 1916, 3,399.

**SEL'KIRK,** ALEXANDER (1676-1723), a Scotchman whose experiences as a castaway on a lonely island are said to have inspired the story of Robinson Crusoe (which see). While sailing in the South Sea on a freebooting expedition he had a quarrel with the captain of the ship, and at his own request was left upon the island of Juan Fernandez, 360 miles west of Valparaiso, Chile (1704). Here he remained in solitude for four years and four months, until rescued by Captain Rogers of the British navy. Selkirk died on board the *Weymouth,*

of which he was at the time lieutenant. His experiences on the island were recorded in two books of the sea published in 1712, and Defoe's *Robinson Crusoe* is believed to have been based on these accounts. Selkirk's exile also inspired a poem by William Cowper—*Imaginary Verses of Alexander Selkirk*—containing the familiar lines:

I am monarch of all I survey—
My right there is none to dispute;
From the center all round to the sea,
I am lord of the fowl and the brute.

For illustration of the Selkirk monument on the island of Juan Fernandez, see page 3177. Consult Howell's *Life and Adventures of Alexander Selkirk.*

**SELKIRK,** Thomas Douglas, Fifth Earl of (1771-1820), a Scotch philanthropist and colonizer, founder of the Red River settlement, out of which grew the Canadian province of Manitoba. The earl was born in Kirkcudbrightshire, Scotland, and was educated at the University of Edinburgh. About 1800 he became deeply interested in the hard lot of hundreds of Scotch peasant-tenants who were evicted from their farms. In 1803 he sent forth three shiploads of such unfortunate families to found a settlement on Prince Edward Island. This colony was so successful from the start that he founded a second colony, Baldoon, in the western part of Upper Canada.

In 1811 he proceeded on a larger scale to found a third settlement, in the valley of the Red River. He bought from the Hudson's Bay Company 116,000 square miles of land. The first settlers reached their destination in the spring of 1812, and by the end of the third year there were about 300 settlers. They spent the winters at Pembina hunting buffalo, and each spring returned to the junction of the Assiniboine and Red rivers to sow their little patches of grain. Their presence was obnoxious to the factors and traders of the Northwest Company, for the latter suspected that Lord Selkirk, being a shareholder in the Hudson's Bay Company, had planted a colony to interfere with the Nor' Westers' trade. Actual hostilities were not infrequent, and in one of these pitched battles Governor Semple (see Semple, Robert) was killed. As a result of this defeat the settlers were driven northward to the head of Lake Winnipeg. Selkirk, who had meantime arrived in Canada, with a force of soldiers restored the ejected colonists to their farms, settled his soldiers in the vicinity and made a treaty of friendship with the Indians.

When news of this situation reached England, both parties to the quarrel were ordered to surrender all their property. Selkirk was unable to secure the conviction of any of the murderers of Governor Semple, and was himself heavily fined on a charge of violence. Bitterly disappointed and broken in health, Selkirk then withdrew to France, where he died. In the year after his death the rival trading companies were combined, and thereafter the settlement of Fort Garry, as it was known, made steady if sometimes arduous progress. It has developed into the city of Winnipeg.

**SELKIRK MOUNTAINS,** a mountain range in the southeast part of British Columbia, extending from the United States boundary to the Columbia River. The Selkirk Mountains are famous for their great glaciers, for heavy snowfall, and for wild, magnificent scenery. Though not as lofty as the neighboring chain of the Rocky Mountains, the Selkirks are more Alpine in character and far more beautiful. The lower slopes, particularly on the west, are heavily wooded, and higher up are countless glaciers, some of enormous size. One of the greatest of them is the Illecillewaet, near the Glacier House station of the Canadian Pacific Railway. This glacier has its origin in the perpetual snow and ice on the mountains to the south, including Mount Sir Donald (10,645 feet), named for Lord Strathcona. The highest peak in the range is Mount Sir Sandford (11,634 feet), named for Sir Sandford Fleming. The beauty of the Selkirks has given this section of the Dominion its nickname, "the Switzerland of America."

The Selkirk Mountains have a length of about 200 miles, and a width of about eighty miles. The range is almost completely encircled by the Columbia River and its tributary, the Kootenay. Though usually regarded as a part of the Rocky Mountains system, it belongs to an older geological period, and is separated from the greater system by the long, narrow Rocky Mountain Trench. Directly southeast of the Selkirks is a minor chain, called the Purcell Range, and farther east the main chain of the Rockies. West and north of the Selkirks is the Gold Range. Gold was discovered in this section in 1857, and silver, copper, zinc, mercury, coal and marble have also been found. Gold mining has reached the stage of the lode mining on a fairly large scale. The Selkirk Mountains were named in honor of Thomas Douglas, Earl of Selkirk (see Selkirk, Thomas Douglas, Earl of). A.P.C.

**SEL'MA,** Ala., the county seat of Dallas County, and a thriving industrial center, is situated west and south of the center of the state, fifty miles west of Montgomery, the state capital, and 162 miles northeast of Mobile. It is on the Alabama River, which permits weekly steamer service to Mobile, and is on the Louisville & Nashville, the Southern and the Western of Alabama railroads. In 1910 the population was 13,649; it was 15,626 (Federal estimate) in 1916, about evenly divided between whites and negroes. The area of the city exceeds three square miles.

Prominent features of the city are the Dallas Academy, the Alabama Baptist Colored University, the Alabama Methodist Orphanage, Y. M. C. A. building, Carnegie Library, Federal building, completed in 1908 at a cost of $150,000, the courthouse and the Vaughn Memorial Hospital. Cotton is the chief crop of the rich agricultural section of which Selma is the commercial center. The city's average yearly cotton receipts are 125,000 bales. It has a large wholesale trade, cotton mills, cotton-seed-oil mills, the Southern Railroad shops, lumber plants and machine shops.

Selma was founded in 1820. During the War of Secession it was an important Confederate military base, and was captured by Federal troops in 1865. M.R.

**SEL'VAS,** extensive woodland plains of the Amazon Valley in South America, covered with the densest vegetation on the globe. They extend from the northern part of Brazil to the Southern part of Venezuela, and occupy the lowlands where abundant rains fall most of the year. In the selvas are found rubber, bamboo, rosewood, Brazil-nut, cacao, wax-palm and many other kinds of trees, all bound together with thick tangles of cacti, orchids and creeping vines. From this immense forest Brazil exports great quantities of rubber and various kinds of valuable wood. See Brazil, subhead *The Great Forests and the Rubber Industry.*

**SEMBRICH,** *zem'briK,* Marcella (1858- ), an operatic singer, whose real name is Marcelline Kochanska, was born at Wisniowczyk, Poland. She was educated in music at Vienna, with Wilhelm Stengel as teacher, and he subsequently became her husband. Her first appearance in opera was at Athens in 1877, when she sang in *I Puritani* with such success that musical critics advised her to prepare for German grand opera. This she did at Berlin, and from 1878 to 1880 was engaged as one of the leading sopranos in the Dresden court theater. During the next five years she became celebrated through her frequent concert tours of England and America. In the latter country she received many remarkable ovations and was rivaled in popularity probably only by Patti. Since 1889 she has made Dresden her permanent home, but has continued her public work, largely in recitals, in Europe and America. Her voice is notable for the extraordinary shading and vigor it displays in a great variety of songs.

**SEMELE,** *sem'e lee,* in the Greek myth, a beautiful daughter of Cadmus. She was wooed and won by Jupiter in the guise of a mortal, but the jealous Juno, taking the form of Semele's nurse, induced her to ask of Jupiter that he appear before her in his divine glory. First she extracted from Jupiter a promise to grant any favor to her she might ask, and then she made her request. In vain the king of the gods protested; Semele was firm, and Jupiter at last was obliged to yield to her entreaties. He donned only his mildest glory, but even this was too much for the mortal eyes of Semele, who was burned to death in the blaze of light which surrounded him. Bacchus, her son, was caught up by his father and saved from destruction.

**SEMINOLE,** *sem'i nohl,* a tribe of Indians belonging to the Muskhogean family, famous for the stubbornness with which they resisted attempts of the American government to force them out of their Florida home. Their troubles with the United States began in 1817, when General Andrew Jackson invaded their territory, which was then a Spanish possession. Two years later Florida was purchased by the United States. In 1832 a treaty was concluded whereby the Seminoles agreed to remove beyond the Mississippi, but several thousand of the tribe under the leadership of Osceola (which see) disregarded the treaty and began war against the United States. A terrible conflict followed, lasting seven years (1835-1842) and costing the government $10,000,000 and thousands of lives. Eventually the Indians were conquered. The majority removed to Oklahoma, where their descendants, who are now American citizens, number about 1,500. A few hundred have been living in the Everglades of Florida, but the government is planning to place them on a small reservation because of the drainage operations in the swamps.

Consult Wilson's *The Seminoles of Florida.*

**Related Subjects.** An illustration of a present-day Seminole Indian and his bride appears

on page 2217. The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Everglades | Jackson, Andrew |
| Florida (History) | Muskhogean |

**SEMIRAMIS,** *se mir'a mis,* a legendary queen of Assyria, whom tradition has made the founder of Babylon and the conqueror of Persia and Egypt. The story goes that she was the daughter of a fish goddess and a Syrian youth, and that when her mother abandoned her she was fed by doves. Rescued by the leader of the king's shepherds, she grew to be a beautiful woman, and finally became the wife of King Ninus of Assyria. After her husband's death she entered upon a spectacular career of conquest, but in the forty-second year of her reign she was deposed by her son and disappeared. Herodotus mentions a queen of Babylonia named Semiramis who lived in the eighth century B.C., and the stories of the legendary queen are probably a combination of fact and fable.

**SEMITES,** *sem'ites,* a group of peoples constituting one of the three main divisions of the white race, the others being the Hamitic and the Aryan. The term *Semitic* comes from *Shem,* the name of one of the sons of Noah, and the classification mentioned above is based on that given in the tenth chapter of *Genesis.* Though the Bible classification is inaccurate, the name Semitic has been retained for convenience. In the Semitic group are included the Hebrews (Jews), Assyrians, Chaldeans, Phoenicians, Carthaginians, Arabians, Ethiopians and various other peoples of similar physical and intellectual traits. It is an interesting fact that the three great religions which acknowledge one supreme deity—Judaism, Christianity and Mohammedanism—had their origin with Semitic races. It was also from a Semitic people—the Phoenicians—that our alphabet came.

**The Semitic Languages** are usually divided into the northern and southern groups, the former including the ancient dialects of Assyria and Babylonia, and the Hebrew, Phoenician and Aramaic tongues. Of all of these, Hebrew is practically the only one that has survived as a spoken language. The Assyrian and Babylonian languages have been preserved as literary monuments of the past by means of the curious wedge-shaped writings known as cuneiform inscriptions (which see). To the southern division belong the Arabic and the Ethiopic languages, the latter being the old church language of Abyssinia. The greatest literary achievements of the Semites are the Bible and the Mohammedan *Koran.*

**Related Subjects.** The reader who is interested in this subject is referred to the following articles in these volumes:

| | |
|---|---|
| Alphabet | Hebrew Language and Literature |
| Christianity | Jews |
| Cuneiform Inscriptions | Mohammedanism |

**SEMMES,** *semz,* RAPHAEL (1809-1877), an American naval officer who commanded the *Alabama,* the most famous Confederate vessel in the War of Secession. He was born in Charles County, Maryland. When Alabama seceded he entered the service of the South, was assigned to the command of the *Sumter,* the first war vessel of the Confederate navy, and began cruising in the West Indies for the purpose of capturing Northern merchant vessels. After the completion of the *Alabama,* which was built in England and secretly sent to sea in 1862, Semmes was made its captain, and in all he captured sixty-seven merchant and whaling ships. After this destructive career, the *Alabama* was sunk in the English Channel in a fight with the United States *Kearsarge,* under Captain Winslow, on June 19, 1864. Semmes was later placed in charge of the James River squadron, and after the war was imprisoned. Having been liberated through the general amnesty order, he devoted himself to the practice of law and for a time was professor of moral philosophy in a seminary at Alexandria, La. His writings include *Service Afloat and Ashore, Cruise of the Alabama* and *Campaign of General Scott in the Valley of Mexico.* See ALABAMA, THE.

**SEMPLE,** *sem'p'l,* ROBERT (1766-1816), a Canadian traveler and governor under the Hudson's Bay Company, who played a brief but prominent rôle in the development of the Northwest. Semple was born at Boston, Mass., but early in life became a wanderer in mercantile pursuits, and between 1803 and 1815 he appeared in turn in South Africa, London, Portugal, Spain, Italy, Turkey, again Portugal and Spain, and finally in Venezuela. In 1815, through the influence of the Earl of Selkirk, he was appointed governor of Rupert's Land for the Hudson's Bay Company.

At the time of Semple's arrival in the Northwest there was considerable bitterness between the employees of the old Northwest Company and the Selkirk settlers in the Red River Valley. The Nor' Westers, knowing that Lord Selkirk was a shareholder in the Hudson's Bay

Company, suspected that the real object of the colony was to interfere with the Canadian company's trade. While Semple was away on a tour of inspection, one of his assistants destroyed Fort Gibraltar, a Northwest Company post half a mile from the settlement. The Nor' Westers prepared to retaliate, and on the nineteenth of June a body of them on horseback were seen to approach Winnipeg. At a spot now marked by the Seven Oaks Monument Semple, with a small party, met the Nor' Westers in a pitched battle which cost Semple's life. See SELKIRK, THOMAS DOUGLAS, for the final result of the struggle.

**SEN'ATE,** the upper house of the Congress of the United States or of a state legislature, and of the Parliament of Canada. The term is also employed variously in Scotland, France, Belgium, Brazil, Chile, Italy and Mexico.

The word *senate* was first used in ancient Rome. Its literal meaning was *council of old men,* so named because it was an assembly composed of the heads of leading families. Romulus was the first to organize a senate, and he selected 100 patricians for his advisors. Under the Republic of Rome the Senate was composed of 300 patricians, plebeians and high officials. Julius Caesar raised the number of senators to 900, and Augustus decreased the number to 600. In the last two years of the Republic, the Roman Senate was in the time of its greatest power. It exercised legislative and judicial functions which included authority over religion, finance and diplomacy, but its brilliant career was rapidly curtailed. Political scientists consider that at one time the Roman Senate came near to fulfilling the highest ideal of reasonable, far-seeing government.

**United States Senate.** The national legislative body is patterned somewhat after the Parliament of Great Britain. Of the two houses composing it the Senate is comparable to the House of Lords in respect to its dignity and importance, although differing in organization and tenure of office of members. The Senate is composed of two members from each state, each chosen for a term of six years by popular vote of the people of the state. Previous to 1912 the whole body of people had no voice in the choice of Senators, their election having been intrusted by the terms of the Constitution to the legislatures of the several states. This rule of over one hundred years was terminated by the adoption of the Seventeenth Amendment.

The Senate of the United States is a continuous body, that is, since its organization in 1789 there never has been a time when among its members two-thirds of them had not sat in the preceding Congress. The Constitution ordained that the terms of service of one-third of the members should expire every two years. This provision leaves always a working majority of members of experience. An exactly opposite condition is possible in the House of Representatives, where the terms of all the members expire together, although in practice the House always contains a large number of men who have seen years of continuous service by reëlection. For salary of a Senator, see CONGRESS OF THE UNITED STATES, subhead *Salaries.*

*Duties of the Senate.* The Senate and House of Representatives are coördinate bodies in the making of laws, and, with the exception of bills for raising revenue (tariff bills), any bill may originate in either house. Upon the Senate obligations are imposed in which the House does not share. The Senate must approve appointments of the President to office in the civil, military and diplomatic service; it must approve all treaties made by the President on behalf of the United States and foreign countries; it is a tribunal for the trial of impeachments and in such case sits as the jury.

*Officers.* By constitutional provision the presiding officer of the Senate is the Vice-President of the United States. As long as the President is capable of performing the duties of his office

the Vice-President's services are limited to his chairmanship in the Senate. Not being a member of the Senate, but placed there through election in which the Senators have no choice, he has no part in the deliberations of that body and has no vote except in case of tie. The Vice-President may at any time be obliged to leave the Senate to assume the duties of the Presidency; also he may be unavoidably absent from sessions. Therefore the Senate provides from its own membership a president *pro tempore* who must hold himself in readiness to preside in place of the Vice-President. This president *pro tempore* receives the same salary as the Vice-President, $12,000, and retains his right to speak and vote.

The secretary of the Senate is responsible for the official conduct of the clerks and all subordinates, except doorkeepers. He is also disbursing officer, and in such capacity pays the salaries and mileage of senators and employees. His salary is $5,000. The sergeant-at-arms has charge of the entire Senate wing of the Capitol and all employees not on the floor of the Senate, and when necessary maintains order and discipline during rare turbulent periods. He is responsible for the care of all halls and rooms belonging to the Senate and of all the property they contain. His salary is $4,500. The chaplain opens with prayer each session of the Senate. Laborers and pages receive $720 to $1,000, ordinary clerks and messengers $1,440, and committee clerks $1,800 to $3,000. A group of skilled stenographers reports the proceedings of the Senate for publication in the Congressional Record, and each receives $5,000 per year.

**Canadian Senate.** The Senate of Canada is described on page 1117 in these volumes, in the article CANADA, subtitle *The Dominion Government*. E.D.F.

**Related Subjects.** The reader is referred to the following articles in these volumes:

Congress of the United States
Constitution of the United States, subhead *Amendments*
Parliament
Reichstag
Vice-President

**SENECA,** *sen'e ka,* a North American Indian tribe of Iroquoian stock, which ultimately became the most important element in the confederacy known as the Five Nations (which see). When the white men first came in contact with them, the Senecas were settled in Western New York between Seneca Lake and the Genesee River. They fought fiercely against the Neutral Nation and the Erie, and absorbed the remnants of these tribes after conquering them (about 1650). They then spread out along the country west of Lake Erie and south along the Allegheny River to Pennsylvania. During the Revolutionary War the Senecas supported the English. About 2,500 live on reservations in New York, and a few others are in Oklahoma and in Ontario on the Grand River Reservation.

**SENECA,** LUCIUS ANNAEUS (about 4 B.C.-A.D. 65), a Roman philosopher who taught the doctrine of the Stoics—that virtue is the highest aim in life. His extant philosophical writings are moral treatises on such subjects as *Consolation, Providence, Tranquillity of Mind* and *A Happy Life*. Ten tragedies are also attributed to him. These are not in themselves of great value, but they had an important influence on the drama of the Renaissance. Seneca was born in the province of Spain, at Cordova. After studying under the Stoic philosopher Attalus, he traveled in Greece and Egypt, gained a reputation in the law courts for his eloquence, and rose to the position of quaestor under the Emperor Claudius. In the year 41 he was banished to Corsica, but eight years later was recalled to Rome by the Empress Agrippina and made the tutor of her son Nero, who became the next emperor. Though Seneca for a few years exerted a good influence on his wilful pupil, eventually he lost all control over him, and in 65 Nero ordered the philosopher to commit suicide. As a philosophical writer Seneca is admired not so much for depth of thought as for breadth of view and his sympathetic way of treating moral problems.

SENECA

Consult Dimsdale's *History of Latin Literature;* Summers' *Select Letters of Seneca.*

**SENECA LAKE,** the largest of the group of lakes in New York known as the Finger Lakes. It is noted for its beauty and is a favorite sum-

mer resort; Watkins Glen is one of the prominent attractions. The lake is thirty-seven miles long and one to four miles wide; its greatest depth is about 600 feet, and it lies about 450 feet above sea level. It is fed by the waters of Keuka Lake, discharges through the Oswego and Seneca rivers into Lake Ontario, and is connected also by canals with the Erie Canal and Chemung River. It receives its name from the Seneca Indians, a powerful tribe who inhabited the district in early days.

**SENEGAL,** *sen'e gawl,* an important French colony in West Africa, between the rivers Senegal and Gambia. The inhabitants are chiefly Berbers and various Negroid races, numbering altogether about 1,800,000 (see RACES OF MEN). Polygamy is extensively practiced, though the French authorities strive to suppress it. The climate is hot and unhealthful for Europeans. There are two seasons, wet and dry; the dry season is fairly healthful, but during the wet months yellow fever, malaria and other diseases are prevalent.

The principal products are cocoanuts, rubber, raisins, millet and maize, mostly for local needs, as there are no manufactures, and the commerce is unimportant. Lions, leopards, cheetahs, wild boars and hyenas are numerous, and crocodiles swarm in the upper portions of the Senegal River. Monkeys of many varieties abound in the forests, and antelopes and gazelles are found in herds on the plains. Gold, iron and quicksilver are exported, and the natives have large flocks of sheep and goats besides many camels and horses. The capital is Saint-Louis, which is connected by railway with Dakar and Rufisque, the two towns next in importance. The principal tree of the territory is the baobab, which has sometimes a circumference of over one hundred feet at twenty feet from the ground.

**SENEGAL,** a West African river which gives its name to the French province of Senegal, on the southwestern border of the Sahara Desert. The Senegal rises near the sources of the Niger, in the mountains of Futa Jallon, and after a course of nearly 1,000 miles discharges its waters into the Atlantic Ocean 110 miles north of Cape Verde. The upper course of the river is marked by many rapids, but near the coast the stream becomes deep and sluggish, coasting vessels navigating to a distance of about 450 miles inland.

The river has two notable and picturesque falls, named Guine and Felu, each about fifty feet in height. The basin drained by the Senegal is hot and unhealthful, and the soil is for the most part unfertile, except where it is covered with forest and rank jungle growth. The river does not discharge its waters direct into the sea, but flows into a lagoon which is separated from the sea by a shifting bar of sand which is extremely dangerous to shipping.

**SENEGAMBIA,** *sen e gam'bi a,* a name formerly applied to the territory between the rivers Senegal and Gambia, on the west coast of Africa. It is now known as Senegal.

**SEN'NA.** See CASSIA.

**SENNACHERIB,** *seh nak'er ib* ( ? -681 B. C.), a king of Assyria, the son of Sargon II, whom he succeeded in 705 B. C. His conquests included parts of Medea, Sidon, Ashkelon, Ekron, Tyre and Aradus, and he was successful in suppressing frequently threatening revolt in Babylonia. He also carried on war against Hezekiah, king of Judah, and Hezekiah was forced to pay him a heavy tribute, as related in *II Kings* XVIII, 13, though in XIX, 35 it is recorded that the strength of Sennacherib was cut down by the angel of the Lord, and that, as a result, he withdrew his forces, never to trouble Hezekiah again. He destroyed Babylon completely, but was soon afterwards murdered by two of his sons. The palace of Koyunjik was one of the most magnificent structures erected by him.

The destruction of so large a part of his army and the liberation of the Hebrews is described in Byron's *The Destruction of Sennacherib,* ending with this stanza:

> And the widows of Ashur are loud in their wail,
> And the idols are broke in the temple of Baal,
> And the might of the Gentile, unsmote by the sword,
> Hath melted like snow in the glance of the Lord!

Consult Johns' *History of Assyria;* Smith's *History of Sennacherib.*

**SEN'SES,** SPECIAL. We see, we hear, we taste, we smell, we feel, we experience sensations of heat and cold, hunger and thirst, fatigue and pain. We are made aware of these sensations through the sensory nerves, which, when properly acted upon, convey impulses to the brain, where they are interpreted. Those senses which bring us knowledge of the world about us—sight, hearing, smell, taste and touch —are called *special senses,* and those that make us aware of our bodily needs are commonly known as *general sensations.* Chief among these are the sensations of temperature, hunger, thirst, fatigue and pain, the last a warning that some organ is failing properly to perform its functions.

The special sensations differ from general sensations in the following particulars:

(1) The nerves of the special senses all end in special organs, as the eye, ear and nose. The nerves producing general sensations do not.

(2) Special senses tell us of the outside world; the general senses tell us of conditions within the body.

(3) Special senses are more exact; we can locate an object by sight and easily determine the source of a sound, but we are often at a loss to locate the cause of a pain.

(4) The meaning of each special sensation must be learned by experience, but the ability to interpret the meaning of general sensations is inherited. The child may not be able to tell a bumblebee from a wasp, but he can distinguish between toothache and stomach ache.

(5) The special senses are important avenues of knowledge, and without them the mind would never awaken to activity. The general sensations are an aid to health. They tell us when we need food and drink, when we need exercise or rest, and warn us against overindulgence in eating, drinking and exercising. W.F.R.

**Related Subjects.** Further information on this subject will be found in the following articles:

| | | |
|---|---|---|
| Brain | Nervous System | Smell |
| Ear | Nose | Taste |
| Eye | Skin | Touch |
| Fatigue | | |

**SENSITIVE, PLANT,** *scn'si tiv,* a small herb belonging to the same family as the pea, so called because the small leaflets which compose its leaves fold over each other in pairs when the plant is shaken or roughly touched. At the same time each of the leafstalks bends toward the main stem, as if the plant were shrinking from the intruder. If the plant is then left undisturbed the leaves will slowly assume their normal position. The sensitive plant is a native of South America, but has been introduced into the United States, where it is sometimes cultivated in greenhouses as a curiosity. The sensitive brier, which grows wild in the Southern states, has the same habit of withering, but does so only when it is very roughly handled.

**SENTENCE,** *scn'tens.* When two or more words are joined in such a way as to make sense, they form a *sentence.* Thus, it is the sentence, not the word, that is the true unit of speech. A word pictures a single idea, but it requires a group of words arranged in definite, grammatical order to express *a complete thought.* For instance, the word *bells* tells us nothing of the speaker's thought until it is combined with one or more other words: as, "Bells ring;" "The great bells in the tower were cast over a hundred years ago."

**Capitalization and Punctuation.** The first word of a sentence is always capitalized, and the close of the sentence is indicated by a period, a question-mark or an exclamation point. The punctuation used in the body of the sentence is an important factor in its construction, particularly if it is lengthy, for correct punctuation helps the reader to make a swift mental analysis and to decide which elements belong together and which do not. See PUNCTUATION.

**Parts of a Sentence.** The two essential parts of a sentence are the *subject* and the *predicate.* The subject, which is always a noun or its equivalent, names the person or thing of which something is said; the predicate embodies what is said about the subject. No matter how long and complicated the subject or the predicate may be, neither one can express a complete thought without the aid of the other.

In the sentence, *Bells ring,* the noun *bells* is the *complete subject* and the verb *ring* the *complete predicate.* In the second sentence quoted above, *bells* is the *simple subject,* and its modifiers are the article *the,* the adjective *great* and the prepositional phrase *in the tower; were cast* is the simple predicate, modified by the phrase *over a hundred years ago.*

**Classification of Sentences.** *As to meaning:* According to the form in which the thought is expressed—that is to say, according to whether it affirms or denies a fact, asks a question, or expresses command, entreaty or request—a sentence is said to be, respectively, *declarative, interrogative* or *imperative.* Thus, *Bells ring* is a declarative sentence—the commonest of all sentence forms. *Do you hear the bells?* is an interrogative sentence. *Listen to the bells* is an imperative sentence. In the interrogative form the predicate, either in whole or in part, generally precedes the subject.

Some grammarians include a fourth classification, called the *exclamatory* sentence, usually introduced by *how* or *what;* as *How sweet those bells sound from this distance!* This is really not a separate class, however, as any of the other three forms may be used in an exclamatory way. For example, *The bells are sounding the alarm!* illustrates the use of a declarative sentence as an exclamation. Similarly with interrogative and imperative sentences; as, *Will you listen to those bells! Hear those bells!*

*As to structure:* With respect to its grammatical structure, a sentence may be *simple, compound, complex* or *complex-compound.* The distinctions are as follows:

A simple sentence is one which, whether long or short, consists of but one subject and one predicate and makes a single assertion: *The bells* (subject) *are ringing* (predicate); *The bells of that old village church, cast more than a hundred years ago* (subject), *still have a most musical chime* (predicate).

A compound sentence consists of two or more simple sentences, each of which makes its own complete assertion. Usually these two or more clauses are joined by a coördinate conjunction such as *and, or, but: Bells are ringing* (first clause) AND *whistles are blowing* (second clause).

A complex sentence consists of one independent clause—that is, a clause that can "stand alone"—and one or more dependent or subordinate clauses: *The bells are announcing* (independent clause) *that the new prohibition law has been passed by Congress* (subordinate clause). A sentence may be both complex and compound; as, *The bells which you hear are hung in the tower and are over a hundred years old,* or *The bells are ringing and the whistles are blowing because the longed-for news has come at last.*

**Order of Subject and Predicate.** The usual arrangement is to place the subject and its modifiers first, and the predicate and its modifiers following. When the complete subject precedes the complete predicate, the sentence is said to be in the *natural order.* If there is any deviation from this arrangement, the sentence is said to be in the *inverted* or *transposed order.*

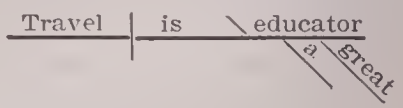
The transposed order is particularly common in poetry, where it is used for euphony and rhythm. When employed in ordinary prose, it is with the idea generally of adding emphasis and strength by bringing the important word or words into the position of importance—the beginning of the sentence. For example, when we say, *A marvelous organizer was Kitchener of Khartum,* we construct a far more impressive sentence than if we said, *Kitchener of Khartum was a marvelous organizer.* Other illustrations of the inverted arrangement are as follows: *For five long days the battle raged; Up sprang the Little Colonel; Into each life some rain must fall; Many a backward glance did we cast at the little town sleeping so quietly in the autumn sunshine; That he should have done so was only to be expected.*

**Analyzing the Sentence.** The *analysis* of a sentence consists in stating its classification and separating it into its component parts; that is, indicating the subject and its modifiers, if any, the predicate and its modifiers, and the function performed by each word, phrase and clause. See ANALYSIS for complete discussion and analysis of a type sentence.

In analysis the transposed sentence is changed over to the natural order and the interrogative sentence to the declarative form. For purposes of analysis, therefore, the inverted sentence, *A hale old man is he,* and the question, *Is he a hale old man?* both read, *He is a hale old man.* To analyze such a construction as *What do you want me to do?* we change it to, *You do want me to do what?* If the sentence is imperative, the implied subject *you* must generally be supplied in analysis; as, [*You*] *write your name on this dotted line.*

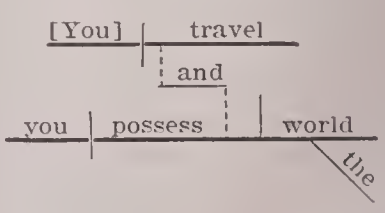
**Diagram of a Sentence.** The *diagram* of a sentence is merely a graphic representation of the analysis. It is a picture that shows, by straight lines, what work is done by each element and in what relations the different elements stand to one another. The following type sentences are diagrammed according to the Reed & Kellogg method, which has been widely adopted as being both simple to construct and easy to grasp. Diagramming is not so widely used as it once was.

SIMPLE SENTENCE: *Travel is a great educator.*



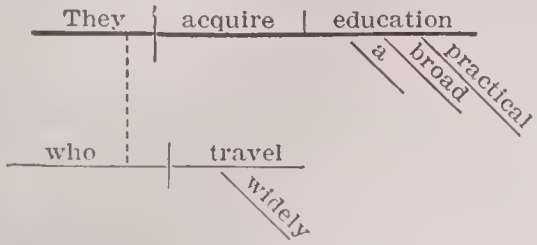

*Explanation:* The principal parts of the sentence—simple subject and simple predicate—are written on the heavy line, which is cut at right angles to mark the division between the two parts. On the lighter slanting lines are written the less important parts of the sentence—the modifiers. The short, oblique line separating *is* and *educator* indicates that the noun is the complement of the verb; if it cut the main line at right angles, it would indicate the object of the verb (see next diagram).

COMPOUND SENTENCE: *Travel, and you possess the world.*




*Explanation:* Since the independent clauses which make up any compound sentence are of equal rank, each one is indicated by a heavy line. The direct object *world* is separated from its verb by a short line drawn at right angles to the main line. Only transitive verbs, of course, can take an object in this manner.

COMPLEX SENTENCE: *They who travel widely acquire a broad, practical education.*




*Explanation:* The independent clause is shown on the heavy line, the subordinate clause on the lighter line. The dotted line indicates that *who* not only serves as the subject of the subordinate clause, but forms the connecting word between the two clauses.

**Characteristics of a Good Sentence.** There are five principal points of excellence which a sentence must possess to qualify as truly good English. First, it must be *grammatically and idiomatically correct.* Second, it must make its meaning absolutely *clear.* It must be *forceful and emphatic.* It must make *smooth, easy and euphonious* speech or reading, without annoying repetitions or grating sound combinations. And, finally, it must have *unity,* presenting one thought completely, instead of being a jumble of unrelated ideas loosely bound by conjunctions.

**Common Errors.** The principal errors that mar the sentences of our everyday speech have been discussed very fully in the articles on the parts of speech and other grammar topics. See list under GRAMMAR. L.M.B.

Consult Bloomfield's *Introduction to the Study of Language.*

**Outline on the Sentence**

I. Definition
II. Capitalization and punctuation
III. Parts of a sentence
  (a) Subject
  (b) Predicate
  (c) Modifiers
IV. Classification
  (a) As to meaning
    1. Declarative
    2. Interrogative
    3. Imperative
    4. Exclamatory forms of these classes
  (b) As to structure
    1. Simple
    2. Compound
    3. Complex
    4. Complex-compound
V. Order of subject and predicate
  (a) Natural order
  (b) Transposed or inverted order
VI. Sentence analysis
  (a) What it means
  (b) Type sentence analyzed (under ANALYSIS)
VII. Diagram of a sentence
  (a) Definition
  (b) Type sentences diagrammed
VIII. Characteristics of a good sentence
  (a) Grammatical correctness
  (b) Clearness
  (c) Emphasis
  (d) Ease and harmony
  (e) Unity

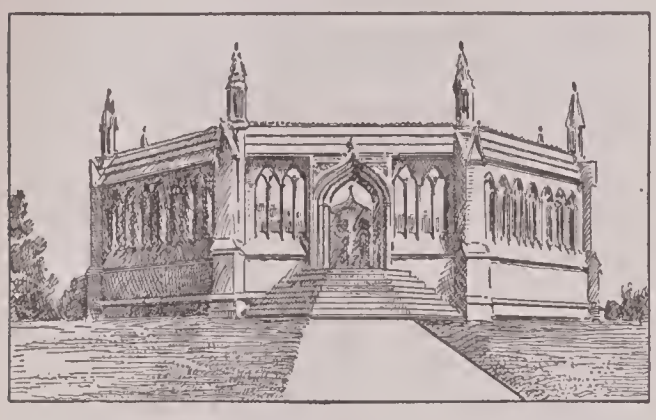
**SEOUL,** *seh ool',* or *sah'ool,* the capital of the Japanese province of Chosen (Korea), is situated in the western part of the country, about nineteen miles to the northeast of Chemulpo, its port on the Yellow Sea, and about three miles north of the Han (or Kan) River. A wall eleven miles in circumference and pierced by eight gates surrounds this old city, which became the capital of the kingdom of Korea over six centuries ago. Seoul is typical of those Oriental municipalities into which modern innovations are slowly making their way. Electric lights, an electric car line which extends to three points outside the city, a telegraph station and a telephone system represent the new era, but the shabby, low dwelling houses and narrow, crooked streets of old Seoul are still in evidence.

A group of former royal palaces surrounded by attractive lawns and gardens, a Roman Catholic cathedral and a temple to Confucius are the buildings of chief interest The city is connected by railway with Chemulpo, Fusan and Wiju. It contains a government school for English students, two hospitals operated by American missionaries, and one large Japanese hospital under government control. Twenty-three Japanese and two Chosen newspapers are published here, besides an English daily owned by the government. Population in 1911, 223,-381. See CHOSEN.

**SEPIA,** *se'pi a,* a dark brown pigment prepared from the secretion found in the ink bags of certain species of cuttlefish (which see). As soon as a fish is captured its ink sac is removed, and the dark fluid is dried at once to prevent decay. The secretion, in the form of powder, is next treated with caustic alkali and acids, washed and dried. The resulting dark brown sepia is used to a limited extent in the preparation of water colors and drawing ink.

**SEPOY REBELLION,** *se'poi re bel'yun,* a mutiny of native troops in India, beginning in May, 1857, and followed in 1858 by the transfer of the government of India to the British sovereign. In its effects it may be regarded as the most important episode in the history of British India. The underlying cause was discontent

because of the introduction of Western ideas and the disregard of the English for native customs and religious beliefs. The climax came when the English ordered the Sepoys, as the native troops are called, to use greased cartridges. The Hindus had religious scruples about tasting anything prepared from the meat



MEMORIAL AT CAWNPORE
The marble building encloses a well where, on July 15, 1857, during the Sepoy Rebellion, many women and children were massacred.

of a cow, and consequently about biting the casings from the cartridges, but these ideas were held in contempt by the British officers.

On May 10, 1857, the native troops at Meerut, a town near Delhi, rose in frenzied revolt, freed from prison their countrymen who had refused to use rifles loaded with the obnoxious cartridges, and massacred the Europeans; they next seized Delhi. The revolt spread and was encouraged by Nana Sahib, who caused a massacre of men, women and children at Cawnpore. Lucknow, after a long siege, was finally relieved by Sir Colin Campbell. The revolt was practically crushed by June, 1858, though Oudh was not completely reduced until the beginning of 1859. A stately memorial has been erected to the Cawnpore victims.

**Sepoy,** from the Hindu word *scpahi,* meaning *a soldier,* is the term applied to a native soldier in the British army in India. The name was originally applied to any member of the Eastern armies, and the more familiar form was *spahee,* from *sip,* a bow and arrow, the weapons used by the ancient Hindu soldiers. The Sepoys in the British service now number about 140,000. They are a very valuable addition to the English forces, as they are courageous, temperate and indefatigable fighters.

**Related Subjects.** In connection with this discussion of the Sepoy Rebellion, the following articles in these volumes may be referred to:

Cawnpore
East India Company
Havelock, Sir Henry
India, subhead *A Great Crisis*
Lucknow
Outram, Sir James

**SEPTEM'BER.** A Canadian poet, Archibald Lampman, gives in his *September* a beautiful picture of the month in his northern homeland:

In far-off russet cornfields, where the dry
Grey shocks stand peaked and withering, half concealed
In the rough earth, the orange pumpkins lie,
Full-ribbed; and in the windless pasture-field
The sleek red horses o'er the sun-warmed ground
Stand pensively about in companies,
While all around them from the motionless trees
The long clean shadows sleep without a sound.

This month, the transition month between summer and autumn, partakes of the character of both seasons. In the southern part of the United States it is one of the warmest months, and even farther north hot days are not infrequent; but nights are likely to be cool, and there is often more than a touch of that golden haze which makes the later autumn days so beautiful.

It is a busy month in rural sections, for it is the harvest period for many crops, and while the "tilled earth . . . naked and yellow from the harvest lies," the "tanned farmers labour without slack," to store away the rich fruits of the fields. In the calendar of Charlemagné September was called the "harvest month," and it still bears that name in Switzerland. The Anglo-Saxons were more specific in their choice of a name, and called September the "barley month."

**History of the Month.** The old rhyme declares that—

# SEPTEMBER CALENDAR

## Birthdays

1. Peter Cartwright, 1785.
   James Gordon Bennett, 1795.
2. Henry George, 1839.
   Eugene Field, 1850.
3. Sarah Orne Jewett, 1849.
4. Pindar, 522 B. C.
   Phoebe Cary, 1824.
5. Cardinal Richelieu, 1585.
6. Marquis de Lafayette, 1757.
   Horatio Greenough, 1805.
   Sir Georges E. Cartier, 1814.
   Jane Addams, 1861.
7. Queen Elizabeth, 1533.
8. Richard I of England, 1157.
9. Thomas Hutchinson, 1711.
10. Mungo Park, 1771.
11. John Ireland, 1838.
12. Charles Dudley Warner, 1829.
14. Charles W. Gordon (Ralph Connor), 1860.
    Charles Dana Gibson, 1867.
15. James Fenimore Cooper, 1789.
16. Francis Parkman, 1823.
18. Samuel Johnson, 1709.
19. William B. Astor, 1792.
20. Alexander the Great, 356 B. C.
21. Louis Joliet, 1645.
    Clark Howell, 1863.
22. Earl of Chesterfield, 1694.
23. Caesar Augustus, 63 B. C.
24. John Marshal, 1755.
25. Felicia D. Hemans, 1793.
26. Samuel Adams, 1722.
29. Robert Clive, 1725.
    Admiral Nelson, 1758.
30. Pompey, 106 B. C.

## Events

1. Aaron Burr acquitted, 1807.
   India passed from East India Company to the Crown; 1858.
   Canadian Land Act went into effect, 1908.
2. Battle of Actium, 31 B. C.
   Treasury Department of United States organized, 1789.
   Russians captured Lemberg, 1914.
3. New style calendar introduced in Great Britain and colonies, 1752.
   Treaty of Paris signed by United States and Great Britain, 1783.
4. Third Republic declared in France, 1870.
5. Exile of Acadians announced, 1755.
   First Continental Congress met in Carpenter's Hall, Philadelphia, 1774.
6. Pilgrims left Plymouth in the *Mayflower*, 1620.
   President McKinley shot by assassin, 1901.
   Peary's discovery of North Pole announced, 1909.
7. German retreat from the Marne, 1914.
8. New Amsterdam surrendered by the Dutch to the English, 1664.
   English gained possession of Montreal, 1760.
   Tornado at Galveston, Tex., 1900.
9. California admitted to the Union, 1850.
10. About 5,000 Acadians banished, 1755.
    Battle of Lake Erie, 1813.
12. President Kruger abandoned the Transvaal, 1900.
13. Battle on the Plains of Abraham; General Wolfe killed, 1759.
14. Battle of Aisne begun, 1914.
15. Russians burned Moscow, 1812.
    Siege of Paris begun, 1870.
17. Constitution of United States signed by Convention, 1787.
18. Quebec surrendered to the English, 1759.
    Rheims cathedral damaged by German fire, 1914.
19. President Garfield died, 1881.
20. Russians began siege of Przemysl, 1914.
21. Rioting in Ireland over Home Rule bill, 1912.
22. Nathan Hale put to death as a spy, 1776.
23. German airship raid over London, 1916.
25. Balboa discovered the Pacific Ocean, 1513.
26. Holy Alliance formed by Russia, Austria and Prussia, 1815.
27. General Howe entered Philadelphia, 1777.
28. Venizelos proclaimed provisional government in Greece, 1916.
29. William the Conqueror landed in England, 1066.
    Italy declared war on Turkey, 1911.
30. Greece, Serbia and Bulgaria mobilized, 1912.

## For Study

Apple
Aster
Baltimore Oriole
Bulbs
Corn
Cotton
Equinox
Fog
Forests and Forestry
Goldenrod
Gourd
Hen
Mushroom
Potato
Roots
Seeds
Sunflower
Wheat

# *SEPTEMBER QUOTATIONS*

1. O sweet September! thy first breezes bring
   The dry leaf's rustle and the squirrel's laughter,
   The cool, fresh air, whence health and vigor spring,
   And promise of exceeding joy hereafter. —*Arnold.*

2. That which is unjust can really profit no one; that which is just can really harm no one. —*Henry George.*

3. A cheerful temper joined with innocence will make beauty attractive, knowledge delightful, and wit good-natured. —*Addison.*

4. You may wear your virtues as a crown,
   As you walk through life serenely,
   And grace your simple rustic gown
   With a beauty more than queenly.
   —*Phoebe Cary.*

5. From dewy lanes at morning
   The grapes' sweet odors rise.
   At noon the roads all flutter
   With golden butterflies. —*Jackson.*

6. By all these lovely tokens
   September days are here,
   With summer's best of weather
   And autumn's best of cheer.
   —*Jackson.*

7. 'Tis education forms the common mind;
   Just as the twig is bent the tree's inclined. —*Pope.*

8. A merry heart goes all the day,
   Your sad tires in a mile-a.
   —*Shakespeare.*

9. To act the part of a true friend requires more conscientious feeling than to fill with credit and complacency any other station or capacity in social life.
   —*Ellis.*

10. Kind hearts are more than coronets,
    And simple faith than Norman blood.
    —*Tennyson.*

11. O sweet September rain!
    I hear it fall upon the garden beds,
    Freshening the blossoms which begin to wane. —*Collins.*

12. Finally, education alone can conduct us to that enjoyment which is, at once, best in quality and infinite in quantity.
    —*Mann.*

13. Be not the first by whom the new are tried;
    Nor yet the last to lay the old aside.
    —*Pope.*

14. A merry heart doeth good like a medicine. —*Proverbs.*

15. Life is to be fortified by many friendships. —*Sydney Smith.*

16. Yes! in the poor man's garden grow,
    Far more than herbs or flowers,
    Kind thoughts, contentment, peace of mind,
    And joy for weary hours. —*Howitt.*

17. The morrow was a bright September morn;
    The earth was beautiful as if newborn;
    There was that nameless splendor everywhere,
    That wild exhilaration in the air,
    Which makes the passers in the city street
    Congratulate each other as they meet.
    —*Longfellow.*

18. Example is always more efficacious than precept. —*Samuel Johnson.*

19. The true purpose of education is to develop, to their fullest extent, the capacities of every kind with which the God who made us has endowed us.
    —*Jameson.*

20. The noblest mind the best contentment has. —*Spenser.*

21. The only way to have a friend is to be one. —*Emerson.*

22. Through the long night the surges roared
    In hoarse, wild rage, against the rocks
    Whose flinty horns their white sides gored—
    Then came the Equinox. —*Blake.*

23. The pollen-dusted bees
    Search for the honey-lees
    That linger in the last flowers of September;
    While plaintive mourning doves
    Coo sadly to their loves
    Of the dead summer they so well remember. —*Arnold.*

24. True friendship is a plant of slow growth, and must undergo and withstand the shocks of adversity before it is entitled to the appellation.
    —*Washington.*

25. Ay, call it holy ground,
    The soil where first they trod:
    They have left unstained what there they found—
    Freedom to worship God.—*Hemans.*

26. Wondrous is the strength of cheerfulness, altogether past calculation its power of endurance. —*Carlyle.*

27. To the contented, even poverty is joy.
    To the discontented, even wealth is a vexation. —*From the Chinese.*

28. Now hath the summer reached her golden close,
    And lost, amid her cornfields, bright of soul,
    Scarcely perceives from her divine repose
    How near, how swift, the inevitable goal. —*Lampman.*

29. Education commences at the mother's knee, and every word spoken within the hearsay of little children tends towards the formation of character.
    —*Ballou.*

30. And soon, too soon, around the cumbered eves
    Shy frosts shall take the creepers by surprise,
    And through the wind-touched reddening woods shall rise
    October with the rain of ruined leaves.
    —*Lampman.*

Thirty days hath September,
April, June and November.

Many of the months have undergone changes in their number of days, but September has always had thirty days since old Roman times. It has not always been, however, as it is today, the ninth month. Before the calendar was revised by Julius Caesar it was the seventh month, and its name is from the Latin *septem,* meaning *seven;* for when the month was shifted in the Julian calendar to the ninth place in the year, its name was not changed.

The only holiday that falls in September is Labor Day, which in all the Canadian provinces and most of the states of the American Union is celebrated on the first Monday in the month. See Labor Day.

**SEPTUAGINT,** *sep'tu a jint,* the oldest Greek translation of the Old Testament. It is supposed that it was begun in the third century, B. C., in Alexandria, Egypt. It was completed before the Christian Era, and had an important influence in the preparation of the world for Christianity as well as in spreading it in the period of the early Church. Its oldest existing manuscripts, the Vatican and the Sinaitic copies, are still much used by scholars in the comparison of texts. The name, meaning *according to the seventy,* refers to an early belief that the translation was made in seventy-two days by seventy-two scholars brought by Ptolemy Philadelphus from Jerusalem. It is commonly indicated by the Roman numerals, *LXX.* See Bible.

**SEQUOIA,** *se kwoi'a,* a genus of cone-bearing trees famed for their gigantic size and their great age. Two species, both native to California, are found—the so-called *big tree,* or giant sequoia, and the *redwood,* or evergreen sequoia. Both species have been successfully introduced into European gardens by the planting of seedlings.

**Big Trees.** These giant trees are probably the oldest living things on the globe. Some of the patriarchs of the group must have been aged trees when the Pyramids of Egypt were being built, for, according to David Starr Jordan, the largest specimens may be seventy centuries old. A tree of average size, twenty-three feet in diameter, was felled, and its annual rings were counted; it was found to be about 2,125 years old. The descriptions of the largest specimens, most of which have been given special names, seem unbelievable to one who has never seen a big tree. "General Sherman" (see illustration on page 1059) has so huge a girth that it requires twenty men to encircle its trunk; the "Keystone State" is 325 feet in height; and the "Empire State" is ninety-four feet in circumference. The "Grizzly Giant," so-called because of its battered appearance, has several branches each of which is six feet in diameter. Through the hollowed trunks of some of the fallen trees two men may ride abreast on horseback, and another specimen, standing square across a roadway, has been cut through at the base and transformed into an archway through which a coach and four can easily pass. A dancing pavilion has been made by polishing the surface of the stump of one gigantic specimen, doubtless the only ballroom of its kind in the world. One traveler in the West tells of a tree having a great hollow burnt in it—probably the work of Indians—and in the space the six ponies and mules of the company were stabled. Yet so great was the vitality of this forest monarch that far above its foliage showed green and fresh against the sky.

The big trees, which are found only on the western slopes of the Sierra Nevada range, grow at altitudes of from 5,000 to 7,000 feet, and occur in scattered groves in the central part of California. One of the finest and best known groves, the Mariposa, is now a part of Yosemite National Park (which see). Other well-known groves are the Calaveras, Stanislaus, Fresno, Merced and Tuolomne. Over a million giant trees, having General Sherman as their chief, are contained in Sequoia National Park (see subhead under Parks, National).

THE SEQUOIA

The trunks grow straight and gradually taper, and the branches begin to appear about half or two-thirds of the distance to the top. The soft, coarse-grained wood is red in the center, but that containing the sap is white.. So dur-

able is the wood that it resists decay for centuries, even when buried in leaf mold. Often an old tree is covered with rough, grooved bark two feet thick, but twelve inches may be considered an average figure. The bark is cinnamon-red on old trees, and reddish-purple on young specimens, and the featherlike leaves resemble those of the pine. The fruit is a small, oval cone containing seeds so small one can hardly believe that from them could grow such mighty trees. It is a picturesque Indian belief that the big trees alone among the children of the forest were specially created by the Great Spirit. All other trees, they say, grew like other plants. The genus was named in honor of Sequoyah, a half-caste Cherokee Indian who invented an alphabet for his tribe. In the words of John Muir—"The big tree is Nature's masterpiece. It has a strange air of other days about it, a thoroughbred look inherited from the long-ago. As far as man is concerned, it is the same yesterday, to-day and forever—emblem of permanence."

**Redwood.** Like the giant sequoias, the redwoods have tall, straight trunks bare of branches for a considerable distance from the base. They are also numbered among the forest giants, for the large trees are fifteen feet in

BUILT FROM ONE TREE
A church at Santa Rosa, California, built entirely from the wood of one great redwood tree.

diameter and 300 feet high, with occasional specimens 400 feet tall. These trees are found on the Pacific side of the Coast Range, in California and Southern Oregon, and are the most valuable timber trees west of the Rocky Mountains. The light, durable wood takes a beautiful satiny finish, and is used extensively for woodwork in houses. It is also valued for building lumber, paving blocks, railroad ties and poles. Fancy furniture and bric-a-brac are made from curly-grained redwood. The redwoods are being felled at a faster rate than the big trees because they grow lower on the slopes and are more accessible, and because many of the giant sequoia groves are in reservations or on private estates and are protected. The woodmen, too, feel that there is less danger from forest depletion, because the redwoods send up suckers from the stumps, and the big trees do not. These evergreen sequoias, though they are not on an average so large as their big brothers of the Sierras, are the more beautiful. B.M.W.

**SERAGLIO,** *se ral' yo,* from the Persian *serai,* meaning *old palace,* is the name given to the ancient residence of the Turkish sultan at Constantinople. It is beautifully situated on a point of land projecting into the sea. Its walls, which embrace a circuit of about nine miles, enclose a variety of mosques, the museum of Constantinople, the harem and large buildings capable of accommodating 20,000 people. As the palace has not been occupied by the sultan since 1839, it is falling into ruin. The word seraglio is now restricted to mean a harem or suite of women's apartments.

**SERAJEVO,** *ser' a ya vo,* the capital of Bosnia, also called Bosna-Serai. See Bosnia, subhead *The Capital City.*

**SERAPEUM,** a name applied to any temple to the ancient deity Serapis (see below). Though the Serapeum at Alexandria was one of the most magnificent buildings in the world in its day, the structure usually referred to when the name is used without modification is the Serapeum of Memphis, in Egypt. This was of peculiar sanctity because in it was placed the sarcophagus of the sacred bull Apis (see Apis). In the vaults below the temple are still to be seen the rock-hewn tombs in which the Apis bulls were buried; and so carefully were the bodies embalmed, and so tightly were the mummies sealed up in their niches in the galleries, that many of them were found in an excellent state of preservation when the tombs were opened about the middle of the nineteenth century by archaeologists from England and from the German universities.

**SERAPIS,** *se ra' pis,* a name compounded of *Osiris* and *Apis,* and used in Egyptian mythology to denote a deity who was never recognized by the true Egyptians but was much worshiped in the Greek and Roman towns in Egypt. The great statue of Serapis, doubtless originally a statue of Jupiter, was kept at Memphis in a beautiful temple called the Serapeum, which was visited by pilgrims from all parts of Egypt because of its special holiness.

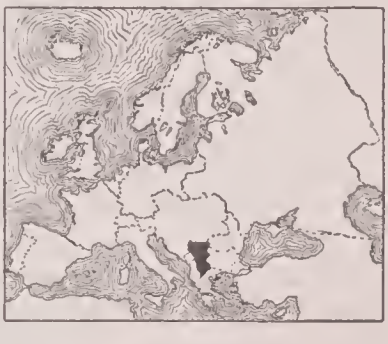
## THE STORY OF SERBIA

**SERBIA,** *sur'bi a,* a country of Europe, situated in the northwestern corner of the Balkan Peninsula and inhabited by the Serbs, a people belonging to the Slav race. The name of *Servia* for the country and that of *Servians* for the people, which were used until recently by English and American writers, are not only incorrect, but they are objectionable to the Serbians, for they suggest the Latin word *servus,* which means *slave.*

Serbia gained its complete independence from Turkey by the Treaty of Berlin, which closed the Russo-Turkish War of 1877-1878. As a result of the two Balkan Wars of 1912 and 1913 the country almost doubled its area. When the War of the Nations broke out in 1914, Serbia had an area of 33,891 square miles, or about 2,400 square miles less than the area of Indiana. It contained 4,548,000 inhabitants, or about a quarter of a million less than the population of Ohio. This little country was one of the greatest sufferers from the great war, for it was overrun by the Germanic troops and held by them to the close of the conflict.

The complete defeat of the Central Powers in the war made possible the union of peoples of the same language and aspirations, and Serbia joined the new Jugo-Slavia as the largest and most important unit in that ambitious state. See JUGO-SLAVIA.

**Its People.** The Serbs are closely related to the Russians, the Poles, the Bohemians and the Montenegrins. They are found not only in Serbia, but also in the adjoining provinces of Jugo-Slavia—particularly Croatia, Slavonia, Bosnia, Herzegovina, Banat and Dalmatia—where they form the great majority of the population. The Serbs and the Croatians speak the same language, but the majority of the Croatians are Roman Catholics, while the Serbs belong to the Greek Orthodox Church. During the last twenty-five years a strong movement for the creation of a Greater Serbia, which would include in one national state all the provinces inhabited by the Serb race, developed. As the realization of such an ideal could be brought about only at the expense of Austria-Hungary, it created a spirit of great enmity between Serbia and Austria-Hungary. The hatred against the latter country was intensified in 1908 when Austria-Hungary formally annexed the provinces of Bosnia and Herzegovina, which are inhabited by large numbers of Serbs.



LOCATION MAP

This little, almost insignificant kingdom of Southern Europe, through the crime of a fanatic, furnished the direct cause needed to fan smoldering war into a consuming flame.

There was certain to be a day of reckoning, for the Serbs became more and more incensed at the arrogance of the Austro-Hungarian government.

**Physical Features.** The country is high and mountainous, being traversed by spurs of the Carpathian Mountains in the northeast, the Balkan Mountains in the southeast and the Dinaric Alps in the west. The highest peak in the country, Liubotrn, reaches an altitude estimated to be 8,600 feet. Extensive plains and many deep and fertile valleys are found between the mountain ranges. The chief topographical feature of the whole region is the wide and extensive valley of the Morava River, which flows through the middle of the kingdom and empties into the Danube. Next in importance is the valley formed by the Vardar River, which flows south and empties into the Gulf of Saloniki, an arm of the Aegean Sea. Other important rivers are the Danube and the Save,

which form the northern boundary of the country, and the Drina and the Drin, which follow the western boundary. The climate is healthful, and is rigorous in the mountains but mild and equable in the lowlands.

**Natural Resources.** Serbia is a country of peasants, and agriculture is the chief occupation of the overwhelming majority of the inhabitants. The land is divided into a great number of small farms, for almost every peasant owns the land he tills. The chief crops, in normal times, are corn, which forms the staple food of the people, wheat and other grains. Large quantities of flax, hemp and tobacco are also raised. Fruit growing forms an important industry, some districts being specially suited for the cultivation of grapes, and others being given over to plum trees. Dried and preserved plums form an important item of export from the country. Forests cover about one-third of the total surface of Serbia and constitute an important source of wealth. The raising of live stock, especially hogs, is one of the important occupations of the people. The country is rich in mineral wealth, the chief minerals found being coal, copper, iron and zinc. Lack of capital and transportation facilities have hindered the developing on an extensive scale of the mining industry.

There are nearly 1,000 miles of railroads. The trunk lines traverse the country from north to south through the two valleys of the Morava and the Vardar. One of the chief railroad lines runs from Belgrade to Nish and from there to Sofia (which see), the capital of Bulgaria. This line is a part of the transcontinental railroad line which unites Berlin and Vienna with Constantinople. At Nish the trunk line which runs south to Saloniki connects with the northern lines.

**Government.** Serbia was a constitutional monarchy and was governed under a constitution adopted in 1889. The legislative power was vested in an assembly, called the *Skupshtina,* the members of which were elected by the people for a period of four years. The executive power was vested in the king and a Cabinet of eight ministers, who were responsible for their acts to the Skupshtina. There was no Serbian government between 1915 and the end of the War of the Nations.

**History.** In ancient times Serbia formed a part of the Roman province of Moesia. At the time of the invasion of the barbarians it was occupied in succession by Huns, Ostrogoths, Lombards and Avars. At the invitation of the Byzantine emperors of Constantinople, the Serbs settled in this region during the seventh century. In the eleventh century the Serbs threw off their allegiance to the Byzantine emperors and established an independent kingdom. This Serb kingdom extended its territory and in the middle of the fourteenth century it occupied a great part of the Balkan Peninsula and included, besides the present kingdom of Serbia, Montenegro, Bosnia, Albania, part of Bulgaria, and the northern part of Greece.

The Turks then invaded the country, and the Battle of Kossovo (1389), which was a defeat for the Serbs, decided the fate of Serbia. By the end of the century the Turks were masters of the country, as well as of the remainder of the Balkan Peninsula. Serbia remained a part

COMPARATIVE AREAS
Serbia, as it existed to 1918, was not quite as large as the state of Indiana.

of the Ottoman Empire for over four hundred years. At the beginning of the nineteenth century the Serbs revolted and compelled the Turks to grant the country an autonomous government headed by national princes. In 1876 Serbia, in order to help the revolt of the Serbs in Bosnia, declared war against Turkey. The Treaty of Berlin (1878) recognized the complete independence of the country, and in 1882 the principality was proclaimed a kingdom.

*Recent Events.* Serbia, together with Bulgaria, Greece and Montenegro, formed the Balkan Alliance which defeated Turkey in the first Balkan War and conquered the vast territory which formed the greater part of the Turkish Empire in Europe. The quarrel between the allies over the division of this territory led to the second Balkan War, in which Bulgaria was defeated. Serbia obtained in consequence a

great strip of Macedonia which was coveted by Bulgaria. The gains of Serbia excited the jealousy of Austria-Hungary, while the attitude of the latter country during the Balkan Wars increased the hatred of the Serbs towards it. The assassination at Serajevo of Archduke Francis Ferdinand, the heir to the throne of Austria-Hungary, on June 28, 1914, by Serb fanatics who expected to further by such means the realization of their ideal of a Greater Serbia, was followed a week later by an ultimatum sent by Austria-Hungary to Serbia, so humiliating that Serbia was loath to accept it, and was given but a few hours to decide. This led to the declaration of war by Austria-Hungary, and to the larger conflict known as the War of the Nations. Austria-Hungary immediately attacked Serbia, but without much success. The great campaign against that country began in the fall of 1915, when Bulgaria joined the Central Powers. Belgrade was occupied by the Austrians on October 9, 1915, and as a result of a powerful drive by overwhelming forces of Austrians, Germans and Bulgarians the whole of Serbia was in the hands of the enemy by the end of 1915. The king, Peter I, took refuge in Saloniki, in Greece, and the Cabinet repaired to Corfu. See WAR OF THE NATIONS.

**Other Items of Interest.** In Serbian the name of the country is spelled *Srbija,* but since *r* partakes of the nature of a vowel, the first syllable is not unpronounceable.

Linbotrn, Serbia's highest peak, is hundreds of feet above any other height of land in the Balkan Peninsula.

The language of Serbia, which is called Serbo-Croatian, is one of the most expressive tongues in all Europe, and the literature which has grown up in it is notable. Serbian writers have excelled particularly in the production of short stories which abound in "local color."

The country has many mineral springs rich in iodine and in sulphur, and attempts have been made to establish popular health resorts, but for the most part without success.

One of the important industries of Serbia is the making from plums of a mild alcoholic liquor known as *raki.*

In proportion to its population, Serbia has more hogs and sheep than any other country of Europe.

Military service is compulsory, and training begins at the age of eighteen, while a man is on the reserve list until he is fifty. For field service, a man is liable between the ages of twenty-one and forty-five.

## *Outline and Questions on Serbia*

**I. Location**

(1) In Balkan Peninsula
(2) Boundaries

**II. Size**

(1) Area
  (a) Before Balkan Wars
  (b) After Balkan Wars
(2) Compared with other countries or states

**III. Geography**

(1) Mountainous character
  (a) Highest peak in Balkan Peninsula
(2) Plains and fertile valleys
(3) Rivers
(4) Climate
  (a) In mountains
  (b) On lowlands

**IV. Resources and Industries**

(1) Agriculture
  (a) Peasant ownership of land
  (b) Crops
  (c) Stock raising
(2) Forests
(3) Mineral wealth
  (a) Undeveloped condition
(4) Transportation

**V. The People**

(1) Race and relationships
(2) Language
(3) Religion
(4) Government
(5) Desire for a Greater Serbia

**VI. History**

(1) In ancient and medieval times
(2) Home rule secured from Turks
(3) Independence
(4) The Balkan Wars
(5) The War of the Nations

## *Questions*

Why are bureaus of charity unnecessary in Serbia?

Why do the Serbians object so seriously to having their name spelled with a *v* instead of with a *b?*

Why could not a Serbian musician play if he broke a string of his fiddle?

How many countries of the Balkan Peninsula are larger than Serbia?

What is meant by the ideal of a Greater Serbia, and why has it thus far been impossible of achievement?

What part did this little country play in bringing about the greatest war the world has ever seen?

How does the loftiest point in the country rank as to height with the other peaks of the Balkan Peninsula?

Of what forms of animal life does Serbia have more, relative to its population, than any other European country?

What is the *Skupshtina?*

When did the Serbs come into this region, and at whose invitation?

What was the fate of the country during the second year of the War of the Nations?

To what unusual use are plums put in Serbia?

Serbia contains no workhouses, and it is almost impossible to find a pauper from one end of the country to the other.

The national instrument of the country is a fiddle with a single string, known as the *gusle*.

A Serbian mother usually carries her baby slung over her shoulder in a canvas bag. O.B.

Consult Woods' *The Danger Zone of Europe;* Stead's *Serbia and the Serbians;* Crawford's *The Balkan Cockpit* (published in the second year of the War of the Nations).

**Related Subjects.** The reader who is interested in Serbia is referred to the following articles in these volumes:

GEOGRAPHY

Balkan Peninsula — Carpathian Mountains
Belgrade — Danube

HISTORY

Balkan Wars — Russo-Turkish Wars
Berlin, Congress of — War of the Nations
Peter I, Karageorgevitch

**SERFS,** laborers under the feudal system in Europe, who were bound by law to the land on which they lived, being transferred with it from one owner to another. The serf system of labor arose in the disorderly period of the early Middle ages, when, in return for protection from raiders, the peasants cultivated the land of the lords and paid them dues on houses, cattle, etc., as they demanded. Serfs were a higher order than slaves and lower than villeins, who were free to go from one lord to another if they chose. Most of the slaves eventually rose to serfdom, and many serfs were able to obtain the freedom of the villein. Both serfs and villeins, however, suffered deep misery from their degraded position, excessive taxation and deprivation of educational and religious advantages. By the nobility and clergy, they were considered as less than the cattle or the game on their estates. The system disappeared gradually, with other institutions of feudalism, in the later Middle Ages, but its spirit survived far into the modern period, till the people themselves arose, from time to time, and wrested their rights from those who oppressed them.

Serfdom in Russia was the result, not of feudalism, but of the despotism of the government. It was abolished in 1861, when 45,000,000 serfs of the Crown were freed by decree of Alexander II. See FEUDAL SYSTEM.

**SERGEANT,** *sahr'jent,* a noncommissioned officer found in every army, next in rank above a corporal. His is the highest noncommissioned rank, the grade above being that of second lieutenant, a commissioned officer. He is usually chosen because of superior intelligence and good conduct from among the corporals of his company (see CORPORAL). His duties are to preserve discipline, to teach drills and to command small detachments, such as an escort body. In the United States service, every company of coast artillery and every company of engineers has eight sergeants; every troop of cavalry and every battery of field artillery has six; and every company of infantry has four, besides the first sergeant and the quartermaster-sergeant.

**SERGEANT-AT-ARMS,** an officer appointed by legislative bodies to enforce order at their meetings, to serve processes ordered by the assembly and to make arrests of members during the session when their presence is necessary to constitute a quorum. The sergeant-at-arms in each branch of the Congress of the United States is an important officer, and his authority cannot be ignored. When the sergeant-at-arms carries the mace (which see) down the aisle of either house all disorder should cease. Anyone continuing in disorder after this demonstration is guilty of contempt. The sergeant-at-arms of the House of Representatives also has charge of the pay roll of the members.

In the Canadian Parliament the sergeant-at-arms of the House of Commons has charge of messengers and pages, looks after the furniture of the house and offices, arrests offenders against the privileges of the house, and carries the mace before the speaker on official occasions during sessions of Parliament.

In Great Britain, such officers are appointed to attend the Speaker in the House of Commons and the Lord Chancellor in the House of Lords. The duties of sergeant-at-arms are also exercised by any of the eight members of the royal household who have charge of the ceremonies at public functions.

The office is said to have been created in the latter half of the twelfth century by Richard I of England, who appointed a corps of twenty-four members to attend him and guard his person.

**SERINAGUR,** *se re'nuh gur,* or **SRINAGAR,** the capital city of Kashmir in India, near the lake made famous by Moore in his *Lalla Rookh.* Serinagur is situated on the Jhelam River, 170 miles northeast of Lahore, in the lovely Vale of Kashmir. There are picturesque mountains in the background, and near by are beautiful gardens. The buildings of the city present a curious combination of different forms of architecture. Serinagur is a center for rug-weaving and the manufacture of silver articles.

attar of roses, paper and leather. Population, about 127,000.

**SEROUS MEMBRANES,** *se'rus mem' braynz.* See MEMBRANES, subhead *Serous Membranes.*

**SER'PENT.** See SNAKE.

**SERPENT CHARMING,** an ancient art in Egypt and the East, the practice of which is usually passed from father to son. It is mentioned in the Old Testament and by many classical writers. Occasionally the serpent charmers cut out the poison fangs of their snakes, to render them harmless, but the custom is not so general as is supposed. The secret of snake charming without danger seems to be the possession of confidence and knowledge of the reptiles' habits. Snakes are fond of music, and the usual way of controlling them is by playing a flutelike pipe. The serpent, resting on the coils of its lower body, will sway the upper part from side to side. Asps have no external ears, so music cannot influence them; regular, rhythmical motion will, however, and the serpent charmer waves his pipe back and forth as he plays. Even professional charmers will play tricks only with the safer, hooded varieties.

**SER'PENTINE,** a variety of rock composed of silica, magnesia and water. It ranges in color through various shades of green to brown, yellow and red. Most varieties are green, spotted or streaked with streaks of white. Serpentine is strong, easily quarried, takes a beautiful polish and is a valuable building stone. Varieties containing iron, however, should not be used for exteriors, since they discolor when exposed to the weather. In some localities in the United States green serpentine is known as *verde antique* marble, though it is not marble. The name serpentine was given this rock because of its green and mottled appearance, which resembles in a slight degree the skins of serpents. Asbestos (which see) is a fibrous variety of serpentine.

**SERUM THERAPY,** *se'rum ther'a pi,* a modern method of treating disease that has made great progress in recent years. Its purpose may be either preventive or curative, but the underlying principle is that the injection of a prepared serum will create in the body of the subject the needed resisting power. By *serum* is meant a fluid compound which will kill the disease germs already present in the blood or render the subject immune to an invasion of a particular disease. Perhaps the most successful serum thus far discovered is the antitoxin used in treating diphtheria. *Therapy* means *therapeutics,* or that part of medical science which treats of the discovery and application of remedies for disease.

Experiments are continually being made to discover serums that will have positive curative effects in cases of tuberculosis, pneumonia, typhoid and other infectious diseases. The usual method of preparing a serum is as follows: Cultures of the particular disease germ are made and injected into the body of a healthy cow or horse. The serum produced in the blood of the animal to fight the poison is then tested by experimentation with some other animal and if found adequate is used on human beings.

The employment of vaccination to prevent smallpox or typhoid fever is an example of vaccine therapy.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Antitoxin | Medicine and Drugs |
| Diphtheria, subhead *Treatment* | Vaccination |

**SERVAL,** *sur' val,* a large, wild cat of Africa, the tawny, black-spotted fur of which appears in the market under the trade name of *tiger cat.* The animal is about three feet long, and has a sixteen-inch tail and rather large ears.

THE SERVAL

As the African native chiefs wear mantles made of serval fur, these wild cats are being threatened with extermination. They are easily tamed if captured when young, but are difficult to raise. It is said that a serval always shows signs of temper when it sees a black man. In South Central Africa, where these cats are fairly common, they hide in thick bushes along river banks, waiting for their prey, which consists of small antelopes, rabbits, fowl and other creatures.

**SERVETUS,** *sur ve' tus,* MICHAEL (1511-1553), a Spanish physician, scholar and theologian, who gained the enmity of Roman Catholics and Protestants during the Reformation and was finally burned at the stake as a heretic.

He was born at Ludela, in Navarre; at the age of seventeen he was sent to Toulouse, France, to study law, but soon transferred his interest to religious questions. For ten years he had a varied existence, first in the train of a Franciscan monk who was confessor to Emperor Charles V, then in the company of various Protestant teachers in Geneva and Basel, later as an editor of scientific works for a firm of publishers in Lyons, and finally as a medical student at the University of Paris. He became skilled in surgery, and delivered lectures on medicine and other subjects.

The various books which Servetus wrote were destroyed as fast as found by Catholic and Calvinist alike; so successful was the hunt that only two perfect copies are known of his last book, *Restitutio Christianismi*. In this volume is a description of the pulmonary circulation, for which Servetus is sometimes credited with the discovery of the circulation of the blood, but the rarity of this book even in its own day explains why Harvey is regarded as the true discoverer.

**SERVIA,** *sur'vi a.* See SERBIA.

**SERVICE,** *sur'vis,* ROBERT WILLIAM (1876- ), a Canadian poet and novelist who won fame for his stirring ballads about life in the Yukon. He has been called the Canadian Kipling, but he must also be given credit for the originality of his material. In some respects he occupies a position more nearly like that of Bret Harte in American literature, for the poems and stories of both men deal with frontier days, with the rough life of the miner, the hunter and the trapper. Service's poems have a characteristic swing which suggests the freedom of the Yukon as he saw it. His first book of verses, *The Spell of the Yukon,* won for him an international reputation, which has been strengthened by his later work, *Songs of a Sourdough, Ballads of a Cheechako* and *Rhymes of a Rolling Stone.* He has also written two novels, *The Trail of '98* and *The Pretender.*

Service was born at Preston, England, and was educated at Glasgow, Scotland, where he became a bank clerk. He came to Canada in 1897, and for several years engaged in farming on Vancouver Island, at the same time making extensive trips along the Pacific coast and through the Yukon. In 1905 he entered the employ of the Canadian Bank of Commerce, which sent him first to White Horse and later to Dawson. After a short time he resigned his position to devote all his time to writing.

**SER'VIUS TUL'LIUS,** the sixth of the seven legendary kings of early Rome. He is credited with having been the author of a reform in the government by which all landowners, and not merely the patricians, as formerly, became subject to taxation and were obliged to do military service. This was the first time the plebeian class were recognized as being of any value to the Roman state, and the reform opened the way for a later struggle for the rights of citizenship. Servius is also said to have added two hills to the five already occupied by Rome, and to have enclosed the whole city with a rampart, wall and moat. See ROME.

**SETI I,** *sa'te,* a famous king of ancient Egypt, who reigned about 1350 B.C. He invaded Syria and met with some successes, but encountered the Hittites, who compelled him to turn back. His chief claim to fame lies in the magnificent structures which he erected, or began, on many of which are sculptured accounts or representations of his conquests. Among the most important of these is the Hall of Columns at Karnak (see THEBES). The great tomb, with its numerous chambers, which he built, was discovered by Belzoni in 1817, and his mummy, with that of his famous son, Rameses II, was found at Deir-el-Bahri in 1881.

SETI I
The head of the mummy of the king and builder who lived at least thirty-two centuries ago.

**SE'TON,** ERNEST THOMPSON (1860- ), a popular writer on nature subjects, identified with the organization of the Boy Scouts of America and the Woodcraft Indians. He was born at South Shields, England, but was taken to Canada in early boyhood, and between the ages of six and ten lived in the Canadian backwoods. Later he lived on the Western plains. Seton was educated at the Toronto Collegiate Institute and at the Royal Academy of London, and he also studied art in Paris between 1890 and 1896. Believing that the average boy needs something to do and something to think about in connection with outdoor life to become a good citizen, he organized, in 1901, the Woodcraft Indians. This society was merged

in 1910 with the Sons of Daniel Boone to form the Boy Scouts (which see). Seton became chief scout of the new organization, and continued in this office until 1915.

The animal stories of Seton, which he himself has largely illustrated, are among the most interesting of their kind. They include *Wild Animals I Have Known, The Biography of a Grizzly, Lives of the Hunted, Animal Heroes* and *Wild Animals at Home.* He has also written for the Scout boys a handbook of the Boy Scouts of America, and for the Woodcrafters *Woodcraft and Indian Lore* and *Manual of the Woodcraft Indians.* Seton is widely known as a lecturer, and he was one of the principal illustrators of *The Century Dictionary.* His real name is Ernest Seton Thompson, but Thompson Seton has been adopted for literary purposes.

**SETTER,** *set'er,* a hunting spaniel, so called because it was originally taught to crouch low in marking game birds. This was in the days when birds were caught in nets, and the dogs had to creep close to the ground to keep their

ENGLISH SETTER

heads out of the meshes when the net was thrown from behind them. After guns came into use in hunting, setters were taught to raise the forefoot in much the same way as pointers do in indicating the game. The standard English setter (see illustration), one of the best breeds, is white, with well-marked black spots. The Irish setter is red, without any trace of black, but it is sometimes marked with white. A well-known Scottish breed is the Gordon setter, which has a rich, glossy black coat, with dark reddish-tan spots about the head and on the limbs. Of the three breeds the Gordon is the heaviest. Setters are handsome, intelligent dogs, and are very obedient and good tempered. See Pointer; Spaniel.

**SEVEN SLEEP'ERS,** heroes of a legend dating from the sixth century. While the city of Ephesus was being persecuted by Decius (A. D. 251) seven Christian brothers escaped to a cave in Mount Celion. The heathen, discovering them there, walled up the entrance with rocks. The brothers fell into a marvelous sleep which lasted till 447, when they were awakened by a shepherd seeking shelter for his sheep. One of their number went down to the city to buy food, but as he offered coin two centuries old he was seized as a thief of hidden treasure and arrested. At his trial the truth was revealed, he was accompanied by the Emperor Theodosius II to the cave, and there with his brothers he convinced his hearers that the miracle was intended by God to confirm and strengthen Christian faith. In the *Koran* the same legend is told, and there the sleepers are accompanied by a dog who refuses to be driven away, saying: "I love those who love God. Sleep, masters, and I will keep guard."

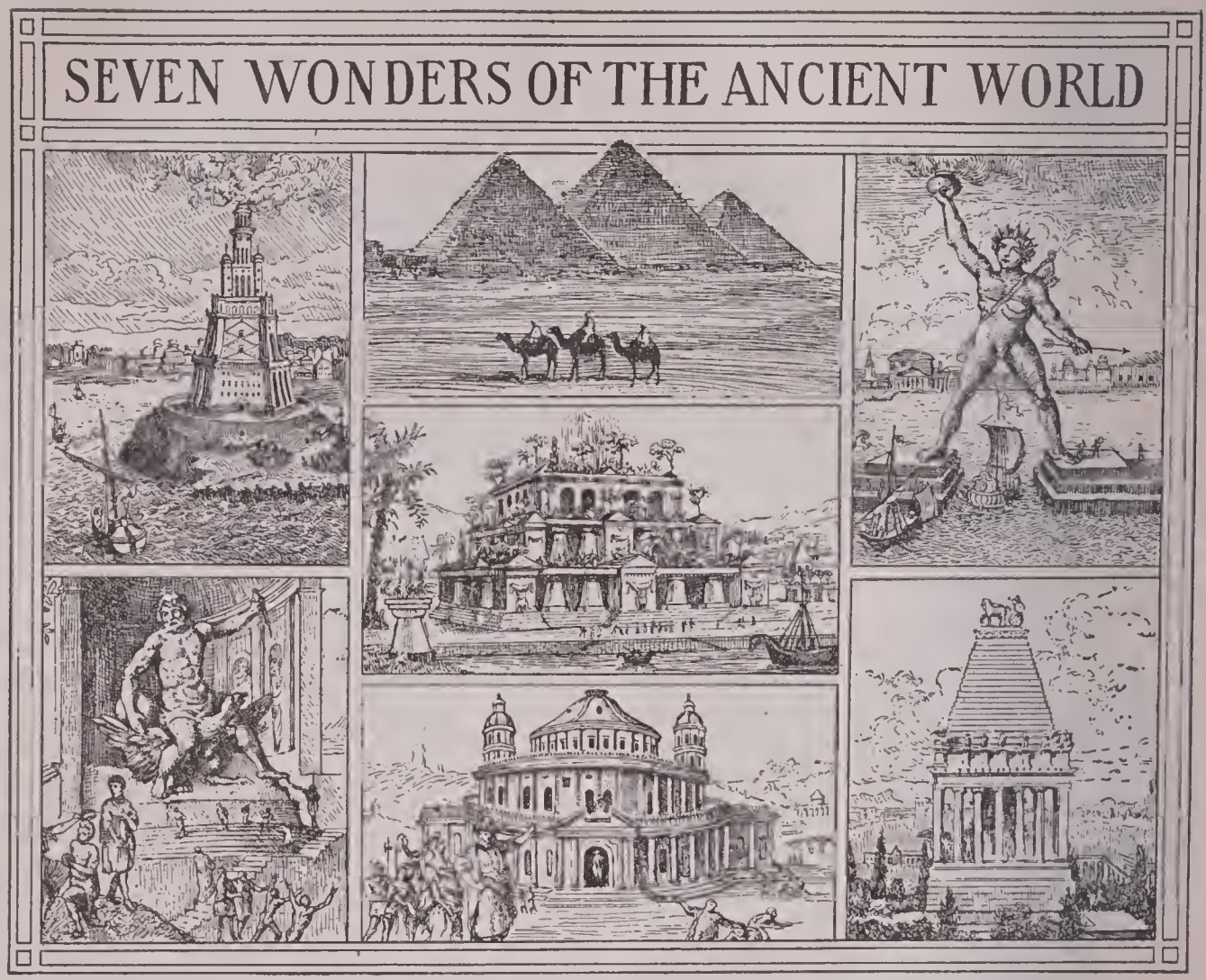
**SEVENTEEN-YEAR LOCUST.** See Cicada.

**SEVENTH-DAY AD'VENTISTS,** a branch of the sect of Adventists, dating from 1845, who believe that the observance of the seventh day (Saturday) as the Sabbath is obligatory upon Christians. In 1850 headquarters were established at Battle Creek, Mich., where they remained until their removal to Washington, D. C., in 1903. Seventh-day Adventists hold that Christ will some day appear again in person, that the dead will sleep until his second coming, that the righteous dead will then be raised to life, and that the living righteous will be made immortal. They put great stress on health and abstinence from intoxicating liquors or self-indulgence of any kind, and were the founders of the Battle Creek Sanitarium, with which, however, they have no longer any official connection. There are nearly 2,000 churches of this denomination in the United States and Canada, having a membership of about 75,000. See Adventists.

Owing to their religious principles these people are not permitted to take active part in war. When the United States entered the War of the Nations in 1917 President Wilson was notified of their position. They agreed that their Church should not shield "slackers," and therefore refused to admit new members during the continuance of the war.

Consult Tait's *Heralds of the Morning;* Loughborough's *The Great Second Advent Movement.*

**SEVEN WEEKS' WAR,** the name given to the struggle which took place in 1866 between Prussia and Austria. The rivalry between the




Pharos of Alexandria
The Olympian Zeus

The Pyramids
Hanging Gardens of Babylon
Temple of Diana

Colossus of Rhodes
Mausoleum at Halicarnassus

two countries had existed for years, and Bismarck had purposely pushed it to the verge of war that it might be decided for all time which of the two states was to be supreme in Germany. The final break occurred over the Schleswig-Holstein question. Prussia had on its side Italy, which hoped to be able to free Venetia from Austria, and the most of the North German states, while Austria's allies were Bavaria, Württemberg, Saxony, Hesse, Hanover and various small states. Following the plans laid out by Von Moltke, the Prussians won victory after victory, and after the battle of Koniggrätz, or Sadowa, it became apparent that there was nothing for the Austrians to do but to make peace. The Peace of Prague, by which matters were formally settled, added greatly to the prestige of Prussia in Germany.

**Related Subjects.** The reader will find additional information in the following articles in these volumes:

Austria, subhead *History*
Bismarck-Schönhausen
Moltke, Count von
Prussia, subtitle *Government and History*
Sadowa, Battle of
Schleswig-Holstein

**SEVEN WISE MEN OF GREECE,** the name commonly applied to seven sages who lived in Greece in the last quarter of the seventh and the first half of the sixth century B. C. Authorities differ somewhat as to the seven names, but the list generally accepted is Bias, Chilon, Cleobulus, Periander, Pittacus, Solon and Thales. Their wisdom was recognized during their lives, and they gained honor and influence as public men in their own cities. Brief poems and short, pithy sentences became current which were supposed to embody their wisdom, such as "Know thyself" and "Nothing in excess."

**SEVEN WONDERS OF THE WORLD,** the seven works of art most noted among the ancients for beauty or for remarkable size. The earliest list of these was compiled from the numerous guide books of the Greeks and differs only slightly from the second and more authentic list found in the work of Philo of Byzantium. This includes the Pyramids of Egypt, the Hanging Gardens of Semiramis at Babylon, the statue of Jupiter, or Zeus, at Olympia, by the sculptor Phidias, the temple of Diana at

Ephesus, the Mausoleum at Halicarnassus, the Colossus of Rhodes and the Pharos, or lighthouse at Alexandria.

**Seven Modern Wonders.** The present age is one of supremacy in science rather than in art, and the wonders of the modern world are its great inventions and discoveries. Leading scientists have agreed that the seven most marvelous scientific discoveries are the wireless telegraph, telephone, flying machine, radium, antiseptics and antitoxins, the X-ray and spectrum analysis. These are called the "Seven Modern Wonders."

The wireless telegraph, invented by Guglielmo Marconi, an Italian, is the only means of communication with ships at sea, and all modern steamships and warships are equipped with wireless outfits. No means of communication has proved of more general convenience than the telephone, invented by Reis of Germany and Gray and Bell of the United States. The aeroplane, invented by the Wright brothers of Ohio, demonstrated its value during the War of the Nations, and all modern military departments have these air crafts in their service. There has been no innovation of greater benefit to mankind or of more importance in surgery than the discovery of antiseptics by Sir Joseph Lister. Antitoxins, radium and the X-ray are all aids to the physician and surgeon in treating human ills. Radium was discovered by Pierre and Marie Curie, and the X-ray was the discovery of Roentgen. Spectrum analysis, of importance in the analysis of the light of stars, chemicals and metals, was discovered by Sir Isaac Newton. E.B.P.

**Related Subjects.** The reader is referred for more detailed information to the following articles in these volumes:

| | |
|---|---|
| Antiseptic, subhead *In Medicine* | Mausoleum |
| Antitoxin | Pharos |
| Colossus | Pyramids |
| Diana, subhead *Temple of Diana* | Radium |
| Flying Machine | Roentgen Rays |
| Hanging Gardens of Babylon | Spectrum Analysis |
| | Telegraph, subtitle *Wireless Telegraph* |
| | Telephone |

**SEVEN YEARS' WAR,** a struggle between Prussia and other European powers which broke out in 1753. Frederick II of Prussia had seized some years before the province of Silesia and had made good his hold on it in the Silesian wars. Although the Treaty of Aix-la-Chapelle confirmed him in his possession of it, Maria Theresa had never given up the hope of regaining it and had done her utmost to form strong alliances against Frederick. Russia joined her readily and looked forward to receiving a part of the conquered Prussian territory at the close of the war. To bring about an alliance with France, the hereditary enemy of Austria, was a difficult matter, but Maria Theresa, under the guidance of her minister Kaunitz, wrote a letter to Madame de Pompadour, the mistress of the French king, and solicited an alliance; and the conclusion of an agreement between Prussia and Great Britain, with whom France was at that time at war in the United States, decided the French to aid Austria.

Frederick the Great, acquainted with all the moves of his enemies, determined to strike first, and in August, 1756, entered Saxony, whose elector he knew sympathized with Austria. He defeated an Austrian army sent to the aid of Saxony, compelled the Saxon army to surrender and made himself master of the entire country. By the beginning of 1757, however, matters looked black for Prussia. Sweden had joined the allies, and thus practically the whole of Europe was united against Frederick, who had as his only ally England, from whom at that time he was receiving little help. A subsidy was paid him by England, but the army of English and Hanoverians which had been sent to his aid was small and badly officered. Frederick marched into Bohemia, won a battle before Prague and began a siege of the town, but was defeated at Kolin in June and driven back into Saxony. The English commander was shortly afterward defeated by the French and forced to make a virtual surrender, which, however, the British government refused to acknowledge. Later in the same year, Frederick won a victory over the French at Rossbach and one over the Austrians at Leuthen and made himself master again of almost the whole province of Silesia, which had been retaken by Austria.

When the campaign of 1758 opened, Frederick's position was somewhat more favorable. He had gained favor and prestige through his conduct of the earlier stages of the war, and on the accession of William Pitt to power in England a policy of more active aid to Prussia was adopted. A new army was organized under Ferdinand of Brunswick, who during the remainder of the war won several victories and was of great help to Frederick. The contest began in 1758 by a defeat of the Russians, and though Frederick was himself shortly afterward beaten he managed to retain possession of both

Silesia and Saxony. A severe defeat at Kunersdorf in 1759 reduced Prussia well-nigh to a state of exhaustion, but the victories of the English over the French in that same year bettered matters somewhat. Frederick won two brilliant victories in 1760, but the death of George II of England and Pitt's fall from power took from Prussia its only ally and made its ruin seem inevitable.

In 1762, at the most critical time, Elizabeth of Russia died and was succeeded by Peter III, an enthusiastic admirer of Frederick. Prussia made a treaty with Russia, and Frederick won several minor victories, but Peter was deposed and plans for an active alliance between Russia and Prussia were at an end. Russia did not, however, again join Austria, and as both sides were practically exhausted, peace was concluded at Hubertsburg early in 1763. Frederick was allowed to keep possession of Silesia, and matters were adjusted as they had been before the war.

**Influence in America.** By no means the least important part of this conflict was the struggle between France and England which ended by wresting from France its colonial possessions in America and making England supreme in India. In United States history this struggle is known as the French and Indian War. A.MC C.

Consult Carlisle's *Life of Frederick the Great;* Longman's *Frederick the Great and the Seven Years' War.*

**Related Subjects.** Further information about the Seven Years' War in its various phases may be gained from the following articles in these volumes:

| | |
|---|---|
| Clive, Robert | Montcalm de Saint-Veran, Marquis de |
| Frederick II (Prussia) | Pitt, William |
| French and Indian Wars | Pompadour, Marquise de |
| Kaunitz, Prince | Silesia |
| Maria Theresa | Wolfe, James |

**SEV'ERN,** one of the principal rivers of England, formed by the union of two small streams which rise in Mount Plinlimmon, in Wales. It flows in a circuitous route through England and discharges into the Bristol Channel through an estuary several miles wide, under which runs a tunnel about four miles long. Its total length is 210 miles, and it is navigable as far as Welshpool, a distance of 180 miles. Great tidal waves have frequently caused serious inundations on its banks. The principal cities on the Severn are Gloucester, Worcester and Shrewsbury.

**SEVERUS,** *se ve'rus,* LUCIUS SEPTIMIUS (146-211), a Roman emperor, of whose family and early life little is known. He was in Gaul when the Emperor Pertinax was assassinated in March, A. D. 193, and at once set out for Rome with his troops, who had declared him emperor.

Julianus meanwhile had purchased the imperial dignity from the praetorian guards at Rome, but his own soldiers turned upon him and put him to death on the approach of Severus, who at once became emperor.

He punished the murderers of Pertinax, and then went to the East to put down a rival to the throne, Pescennius Niger, whom he defeated in 194. On his way back he took Byzantium, after a siege which lasted over two years, and there in A. D. 197 he overthrew Albinius, another rival. After a successful campaign against the Parthians he went to Britain, where he penetrated to the extreme north of the island, losing many of his men; and to guard the people of the south from the invasions of the Highlanders he built a wall across the island from the Tyne to the Solway Firth (see ROMAN WALLS).

**SEVILLE,** *se vil',* an important city of Spain, famed in poetry and song. It is situated on the Guadalquivir River, about sixty-two miles northeast of Cadiz, in the midst of a country of sunny vineyards, orange and olive groves, and is variously called "The White City on the Guadalquivir" and "Queen of Andalusia." It has an added fame in being the birthplace of Spain's two greatest masters of painting—Velasquez and Murillo.

For many centuries Seville was the home of the Moors, and its architecture now presents a curious mingling of Moorish and Christian forms. In recent years it has lost much of its picturesque Moorish atmosphere, apparent in the network of small, shaded streets, the quaint, balconied houses built around handsome courtyards and gardens, and the fine squares studded with fountains, for Seville is being enlarged and beautified in a modern sense. Its narrower quarters are being cleared away to make room for modern homes and shops. However, there are still to be found many of the old foot streets, where no carriages go, and which are lined with bazarlike shops overhung with "sails" drawn from roof to roof. There one brushes shoulders with the picturesque cigarette girls and the gayly-dressed peasants and vendors, recalling days of long ago.

Only a few remains are now visible of the wall of sixty-four towers, which once encircled the city. The greatest ornament of Seville is its cathedral, built in 1401-1519, on the site of

a Moorish mosque. It stands in the central square and is the third largest cathedral in Europe. Near by is the Court of Oranges, with a fine fountain in the center, encircled by a grove of orange trees. There also stands the beautiful Campanile, or bell tower, called Giralda, which is almost 300 feet high. Surmounting it is a Christian bell tower, at the top of which, like a weather vane, turns a colossal statue of gilded bronze; this tower has twenty-two sweet-toned bells. Another of the glories of Seville is the Alcazar, an ancient palace of Moorish kings. Other interesting buildings and public institutions are the House of Pilate, with marvelous courts and grand halls; the Museum of Paintings, containing masterpieces by Murillo, Velasquez and other artists of the Seville school; the Exchange, built in 1585 and housing the archives of the Americas; and the Columbian Library, founded by the son of Columbus.

Although Seville no longer lays claim to the title of "Spanish Athens," which it once so proudly bore, it is still a great intellectual center. Next to Madrid it is the most flourishing city in art, literature and university education in Spain. It is rapidly recovering much of the commercial prosperity which it enjoyed in the seventeenth century, when it was the chief port of Spanish commerce, and has built up an extensive industry in the production of cigars and the manufacture of pottery, cannon, silks, cotton and numerous other commodities. Population, 1911, 155,360. R.D.M.

**SEVRES,** *seh'vr',* a small town in Northern France in the department Seine-et-Oise, southwest of Paris, from the outer fortifications of which it is about three miles distant. Sevres is celebrated for the manufacture of the porcelain bearing this name, and for its stained glass and mosaics. The Porcelain Museum, which is one of the chief features of the town, contains a large and interesting collection of china and earthenware assembled from all parts of the world. The porcelains of Sevres have been the admiration of Europe since the first days of their production at Vincennes, their original home. In 1756, for want of space, the industry was transferred to Sevres and placed under state control. Many famous artists were employed to decorate the plaques, enormous vases and ornaments of all kinds, which are still the treasures of collectors. However, the market is now being flooded with spurious works made in Germany and England, which are very clever imitations of the original. Population of Sevres in 1911, 8,395.

**SEWAGE AND SEWERAGE,** *su'ayj, su'er ayj.* Sewerage is a system of pipes and conduits constructed for conveying waste matter, known as sewage, from houses and factories and depositing it at a safe distance from centers of population. Sewers also drain off either the whole or a part of the surface water of land; in this connection they are more commonly known as *drains.* A single system of conduits carrying both sewage and rainfall is known as the combined system. The most satisfactory system, however, supplies separate pipes and conduits for surface water. Where the combination plan is used it is not uncommon for sewers, choked by the sudden influx of rain water, to discharge sewage backward into cellars and basements.

In the great cities of the modern world, the disposal of sewage is a problem of first importance, and proper methods are indispensable to preserve the health of the community. Sanitary methods of disposal have, therefore, received increased attention from engineers, health departments and municipal officers generally. Marked improvement has resulted.

The commonest type of sewerage system is the so-called water-carriage system, in which waste materials are diluted with water and conveyed away from town or city by natural flow, or gravitation. The sewage is conducted through pipes of varying caliber from private homes to public conduits of considerable diameter and discharged at a distance, often into streams or into the sea. On the farm or in small villages, it is practicable to dispose of waste in the soil, but such methods will not serve in dense centers of population.

The house drain, which is of glazed stoneware, from four to six inches in diameter, discharges its matter into somewhat larger pipes of earthenware or cement, and these in turn empty into larger conduits of brickwork or cement, called *mains.* The ordinary sewer pipe is made of salt-glazed, vitrified earthenware, having a smooth surface so as not to impede the flow. It is made in short lengths, having a socket at one end into which the next length of pipe is fitted. A bit of hemp packing and Portland cement close the joint.

The larger sewers, or *conduits,* are constructed of several layers of brick resting on a cement bed, or of cement itself. Their diameter may be very great, to accommodate populous neighborhoods. All the pipes of the system are set at a uniform gradient so as to give a steady flow, which should be at least 2½ feet

a second. Where the ground is quite level, it is sometimes necessary to facilitate the flow by means of pumps. The decomposition of sewage gives rise to poisonous gases, and in the interest of health sewers are ventilated; that is, shafts with iron gratings are placed at frequent intervals so that air may reach the conduits. When these are large enough to permit a man to descend to clean or inspect the sewer, they are called *manholes*. Such manholes are placed at each change of direction of the conduits and at junctions with the branches. Not all the gas, of course, escapes through the shafts; it is customary, therefore, to protect sinks and washbowls from an influx of gas by fitting an elbow in the pipe, which holds enough water to exclude noxious fumes.

When cities are situated on the seaboard or the shores of large lakes, the sewerage system usually empties into deep water. Rivers are also used for this purpose, for it has been proved that after a flow of five miles through running water thorough purification has resulted. With the enormous growth of American and Canadian cities, however, this generally prevailing practice has sometimes resulted in a certain amount of water pollution, due to vast quantities of sewage and lack of sufficient water to purify it. Of recent years increased attention has been given to scientific methods of sewage disposal practiced in England and on the continent of Europe. There the sewage is often treated with chemicals in huge tanks, lime alone or lime in conjunction with aluminum or ferrous sulphate being used as a purifier. Septic tanks and contact beds or sand and percolating filters are becoming increasingly common. In the tanks, bacteria convert harmful organic matter into harmless minerals. Contact beds are water-tight compartments, filled with broken stone or clinkers, in which the sewage is acted upon by bacteria and purified. Such methods of clarifying sewage are expensive and have not yet been widely adopted in the United States or Canada.

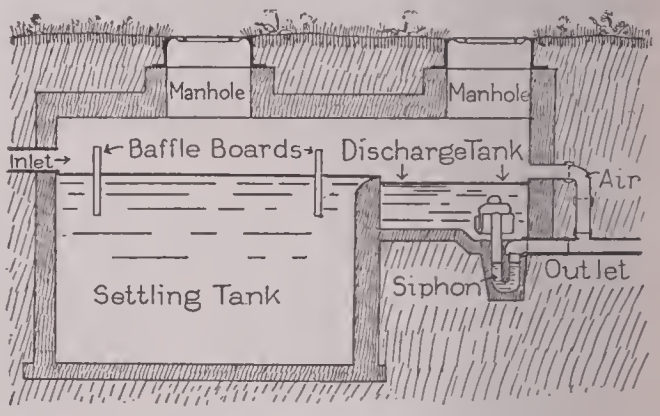
Besides the sewage, there is a considerable amount of waste matter, such as ashes and garbage, which cannot be disposed of by the sewerage system. This is collected in carts and burned at incinerating plants or deposited where it cannot do harm. In the more scientific method of disposal, reduction plants convert much of this waste into grease and other salable commodities. G.B.D.

Consult Kershaw's *Modern Methods of Sewage Purification*; Easdale's *Sewage Disposal Works*.

**Related Subjects.** The reader is referred to the following articles in these volumes:

Garbage
Sanitary Science
Sewage Disposal on Farms
Well Boring

**SEWAGE DISPOSAL ON FARMS.** Owing to engineering progress, people now dwelling in the rural districts may without undue expense enjoy the convenience of running water in the home. Many farmers and suburban dwellers,




A SEPTIC TANK

Sewage enters at one side and is prevented by the baffle boards from causing a direct flow across the tank. When the settling tank is full any excess trickles into the discharge tank. As this gradually fills, the air in the cap of the siphon is compressed until it suddenly forces out the contents of the siphon, drawing after it the water in the discharge tank. The pressure of the air in the air pipe prevents the absolute exhaustion of water from the siphon, which would cause a gradual instead of a sudden discharge.

however, though aware of their ability to install pumping machinery, refrain from doing so because they do not know what to do with their sewage. But here, too, science has come to their aid, by devising schemes for employing the purifying forces of nature.

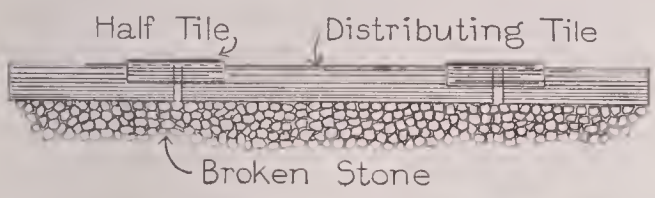
The chief danger from unscientific handling of drainage, as in carelessly built, old-fashioned cesspools, is, of course, contamination of wells. But under the system here described, and under many others which have been designed by scientific men for special conditions, sewage may be handled with even better results than are obtained in cities.

This system combines what is known as a *septic tank* and *subsurface irrigation*. Its effectiveness arises from the fact that in all surface soil there are certain bacteria which are able to render waste matter harmless if it is liquefied and well distributed.

The sewage first enters the septic tank, which is closed both to air and to light, and here in a period of twelve hours or more its own bacteria break up most of the solid matter. The tank is usually of brick, concrete or steel, and ought to be far enough in the ground so that

its contents will not fall below the temperature of 60° F. If the size of the tank is properly proportioned to the amount of sewage it will not be necessary to clean it except at long intervals.

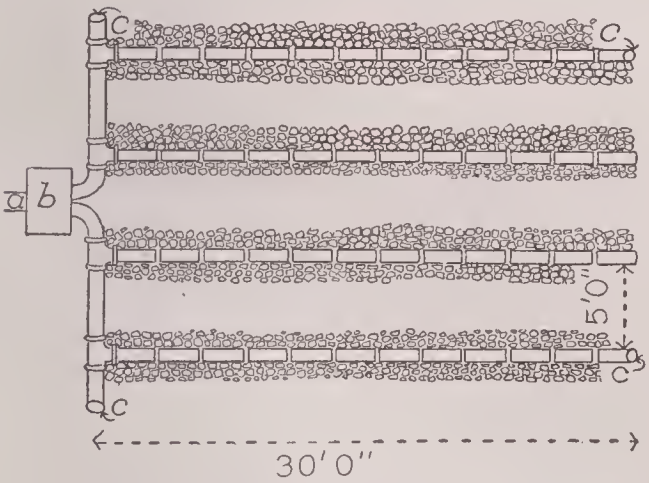
About four times a day a part of the contents of the tank is discharged into the distributing




THE TILES

The distributing tiles are about eighteen inches below the surface, and slope gradually away from the pit. In heavy soil, or in regions where frost penetrates deeply, they should be laid in crushed stone or cinders, as shown. In some cases it is also advisable to have drain pipes beneath this porous foundation. The tiles are laid as illustrated, with their ends about half an inch apart, the half tiles being added on the upper side of the joints to keep out sand and dirt.

pipes, as explained beneath the second picture. The suddenness of the action causes the liquid to be distributed through all the pipes, whence it seeps into the soil and is taken care of by nature. Heavy soils may in the course of a week or two become saturated, so that the bac-




SUB-SURFACE IRRIGATION

(*a*) Pipe from septic tank; (*b*) distributing pit; (*cc*) fresh air inlets.

The total amount of tile should be more than one lineal foot for each gallon flowing from the tank in a day. The distributing pit is a small brick chamber with an inlet at the back and two outlets at the front, either of which can be closed.

teria are unable to do their work; for this reason the distributing system is designed in two parts, so that the flow can be given to one section of the soil for several days while the other part rests. C.H.H.

**SEWARD,** *su'erd,* William Henry (1801-1872), an American statesman, Secretary of State during the War of Secession, and an efficient aid of the President in the councils that determined the policy of the nation during that struggle. He was born in Florida, Orange County, N. Y., and was educated at Union College. After practicing law for several years he gradually became prominent in politics, serving as governor of New York from 1838 to 1842, and in 1849 entering the United States, Senate, where he became influential as a party leader. He firmly resisted the extension of slavery and distinguished himself by his eloquent speeches opposing the Compromise of 1850 and the Kansas-Nebraska Bill.

WILLIAM H. SEWARD

He sought the Presidential nomination in 1860, but Abraham Lincoln won it. Seward became the great Secretary of State of Lincoln's Cabinet, but was held up to ridicule when he purchased Alaska—"Seward's frog pond"—from Russia. It proved to be one of the best investments ever made.

In 1860, when he was defeated by Abraham Lincoln for the Presidential nomination, Seward exerted himself to secure Lincoln's election, and later was appointed Secretary of State. In this high office he reorganized the diplomatic service and succeeded in preserving the confidence of Europe which had been ready to give support to the Confederacy. On the night of Lincoln's assassination, Secretary Seward was confined to his room by a fall from his carriage, but he was also a victim of the conspiracy and was seriously wounded by an accomplice of Booth. He slowly recovered and served as Secretary of State under Andrew Johnson, continuing in office until the inauguration of President Grant. Among the important tasks that he accomplished were the adjustment of the Trent Affair (which see) and the Alabama Claims (see Alabama, The), and the negotiation of the treaty by which Alaska was purchased from Russia.

**SEWING,** *so'ing.* In the days of our grandmothers the sewing connected with the furnishing of the home and the clothing of the family was as much a part of every woman's daily task as was the setting of the table or the making of the beds. Often these good and capable housewives took the flax from the plant or the wool from the sheep and spun it into the yarn and then wove it into the cloth which was used

for making towels, sheets, tablecloths, or any of the household linens or for clothing for the family. There have been times when every article, excepting the boots or shoes but including the straw hats as well as the men's suits and other articles of wearing apparel, have been fashioned by our grandmother's hands. She braided the straw, and from the raw fiber she spun the yarn and thread and wove the cloth; then she cut and made every article. In those days the spinning wheel and the loom were seen in every home. It is such a picture Longfellow gives us in *Evangeline* when he says:

Close at her father's side was the gentle Evangeline seated,
Spinning flax for the loom, that stood in the corner behind her.
Silent awhile were its treadles, at rest was its diligent shuttle,
While the monotonous drone of the wheel, like the drone of a bagpipe,
Followed the old man's song and united the fragments together.

And again, later in the same story, how much these words tell us of the women of that day:

Simple that chamber was, with its curtains of white and its clothes press
Ample and high, on whose spacious shelves were carefully folded
Linen and woollen stuffs, by the hand of Evangeline woven.
This was the precious dower she would bring to her husband in marriage,
Better than flocks and herds, being proofs of her skill as a housewife.

**A Revolution in Production.** But in the beginning of the nineteenth century great changes came about in the social and economic life of the American people. The growth of purely industrial activities and the rise of manufacturing centers and the growth of cities brought about a complete revolution. Mills and factories sprang up all over the eastern part of the continent, and soon the rag carpets and the beautiful coverlets and the homespuns were laid away in the attic or given away, and their place was taken by the new commercial products.

But this was not all. The girls and women found employment in these factories and soon the arts of the home—sewing and cooking, sometimes called the Home Sciences—were rapidly becoming lost arts. Not only were spinning and weaving forgotten, but even plain sewing and mending were no longer familiar subjects to the girl; and since such a very large percentage of girls marry and have homes and families, this ignorance was soon very evident. When the women of the country realized the existing conditions, it was apparent to some of them that a solution must be found by which sewing could be revived and encouraged. The home had given up teaching the girls how to sew, and since this knowledge is so necessary to a girl's complete education, the school was considered the logical place for such instruction.

The women of Boston, assisted financially by Mrs. Hemenway of that city, were the first to succeed in having sewing taught in the schools. That was in 1854. The legislature of Massachusetts legalized the teaching of sewing in 1876. From this modest beginning the teaching of sewing has spread until it is included in the course of study of every up-to-date elementary, high and normal school and of most colleges. There are many commercial institutions specializing in the teaching of sewing, and new books on the subject are being added to the list every week. There are also many courses in sewing offered by correspondence schools.

To-day no girl's education is complete unless it includes enough instruction in sewing to enable her to prove her skill as a housewife, to be able to purchase materials intelligently, to appreciate what is good in design, what material is appropriate for each garment or household article and the proper clothes for all occasions. Every girl should know how to make her own clothes and also how to alter ready-to-wear clothing and add those little touches which make her clothes individual and characteristic of the well dressed woman. The courses and instruction offered have done so much to revive the appreciation of sewing that we find such quotations as the following, taken from Porter's *Laddie:*

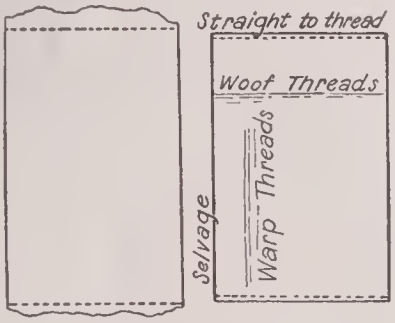
The gay belles of fashion may boast of excelling
In waltz or cotilion, at whist or quadrille;
And seek admiration by vauntingly telling
Of drawing and painting and musical skill;
But give me the fair one, in country or city,
Whose home and its duties are dear to her heart,
Who cheerfully warbles some rustical ditty,
While plying the needle with exquisite art;
The bright little needle, the swift-flying needle,
The needle directed by beauty and art.

The location of the school, the economic condition of the people, their customs, the fashions of the day and the aim sought, largely determine a course of study in sewing for the girls of any institution.

Hand sewing should be taken up first, and the student should become familiar with all the stitches used in plain sewing. There are articles

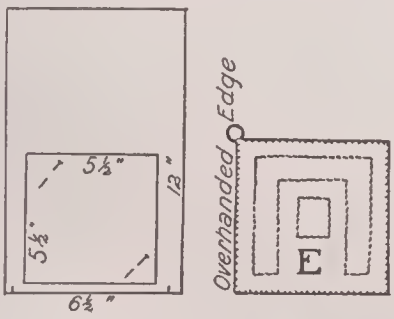
without number in which these stitches are used, and the following course gives only a suggestive list.

**A Dish Towel.** This problem includes a study of the fiber of which the material is made; this may be cotton or linen or union. (See COTTON and FLAX in these volumes.) The terms *warp, woof, selvage* and *hem* should become familiar to the student through the dictionary. The plain stitches—basting and hemming—should be mastered in this article, and it is well to add a personal touch such as an initial in an ornamental stitch; either the chain or outline stitch is appropriate.



DISH TOWEL

**A Holder** (for lifting hot dishes). This article should be made of crash or of unbleached muslin, and should be constructed in such a way as to insure good results after frequent laundering. The finished holder should measure five and one-half inches each way, thus affording excellent practice in measuring, folding and basting. In addition to the work given in the first problem, overhanding on the edge and the running stitch to hold the padding in place is given. A ring or buttonholed loop for hanging should be inserted in one corner.

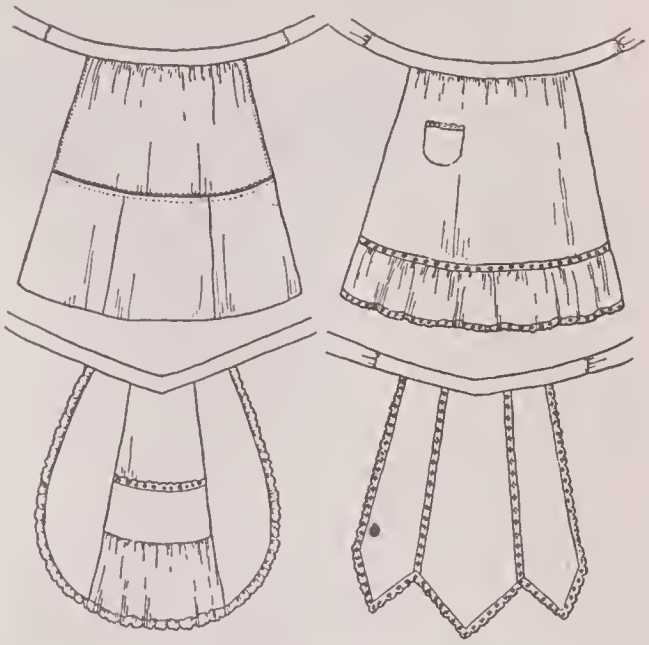


A HOLDER

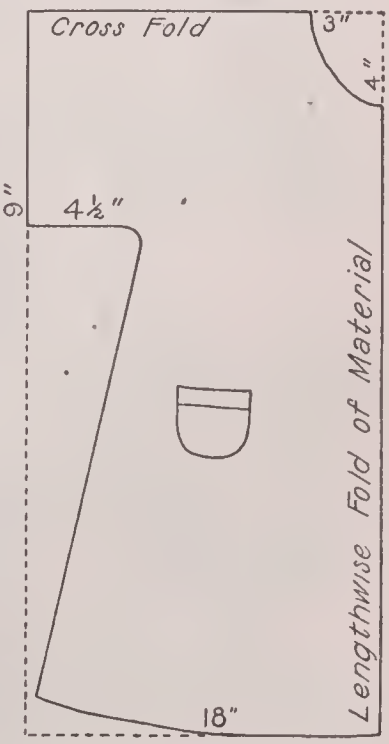
**The Sewing Apron.** This is a lesson in designing, cutting and making. The accompanying sketches are suggestive of a few of the many styles that may be used in the making of this garment. The study of good proportions and a little experimenting with tape measure, scissors and paper will enable the student to cut any of the patterns. The student should study the finer cotton materials, making a collection of samples, giving the name, width and price of goods suitable for the making of a dainty sewing apron. Some of these materials are flaxon, dimity, dotted Swiss, cross-barred muslin, lawn and organdie.

The new problems in this project are gathering and putting on the band, the making of French seams, joining the ruffle and the whipping on of lace.

**Problem in Machine Work.** Following the sewing apron there should be plenty of machine practice. A slip-over cooking apron or night-


SEWING APRONS

dress or a kimono afford excellent opportunity for long-seam stitching. The sketch shows an easy draft for the cutting of a cooking apron or nightdress. If one wishes, the cooking apron may be cut up the back and faced with a straight piece of material and fastened with buttons and buttonholes. The neck should always be finished with a bias facing. A belt adds a finishing touch.



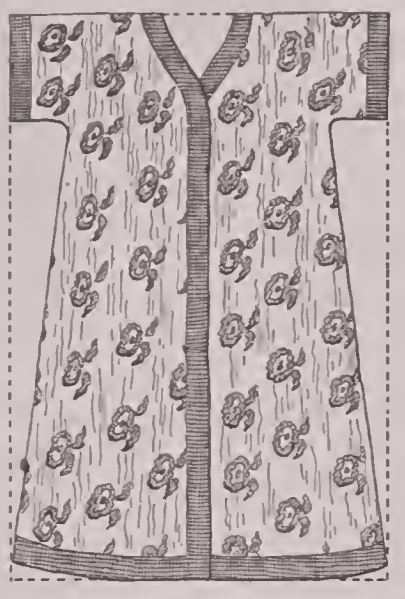
PATTERN
For kimono, apron or nightgown.

Percale, cambric or longcloth are suitable materials for the apron, any of the materials discussed under *Underwear,* below, are the best for the nightdress. The beautiful and artistic cotton crapes are chosen for the kimono.

**Study of Commercial Patterns.** Every firm putting paper patterns on the market has an

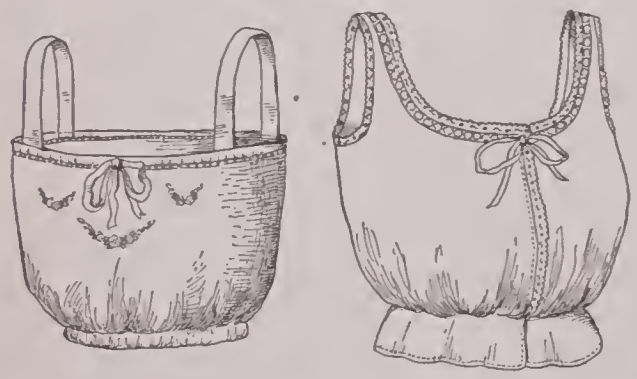
expert in charge of the work; a careful study of the printed matter on the pattern and the accompanying chart will enable the student to cut the garment without mistakes or waste of the material.

The pattern should be carefully measured and the alterations made as directed before it is placed on the material; never trust to making the necessary alterations when fitting the garment. The other most important caution is to observe the markings of the pattern for placing on folds and on lengthwise threads of the material. In addition, one should place the material so that the nap of the cloth will lie in such a position that it will be flat when the garment is brushed downward. Many a garment owes its poor fit to the careless placing of the pattern.



KIMONO
Cut from pattern in preceding picture.

**Underwear.** Every possible effort should be put forth to make and keep underwear dainty and beautiful. Narrow facings, hems and tucks, handmade laces, bits of hand embroidery and

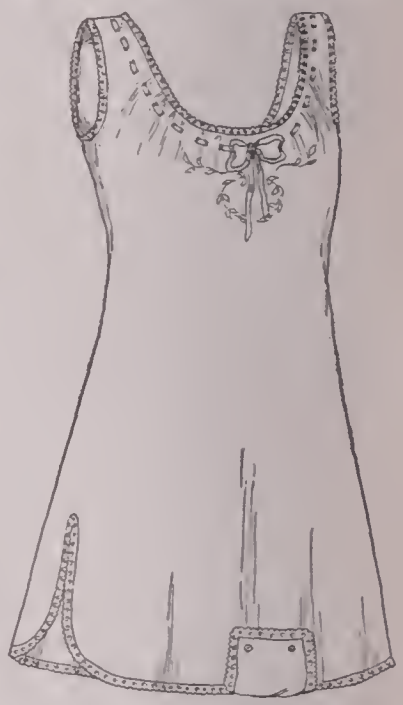


CAMISOLE AND CORSET COVER

snowy ribbons should appear here. If a bit of color is desired, only pale pink or baby blue are to be used.

Narrow, flat seams in garments that come next to the body and French seams measuring from one-eighth or less to a quarter of an inch in width in the other garments are used in underwear. These seams require much skill—in fact, so much skill that in some technical schools this phase of sewing is given during the last year of the course and ranks with fine baby clothes in the requirement of technical skill.

Just as much care should be taken with the fitting of an undergarment as with a dress. Bands should be exactly the right size, fastenings should be placed in their proper places, and attention should be given to every detail of the work. One-piece plackets are usually used, and these should be narrow and neatly fitted and finished.



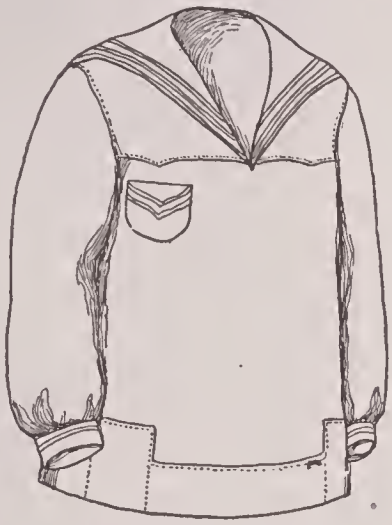
ENVELOPE CHEMISE

All buttons should be as small and inconspicuous as will answer the purpose. Buttonholes are to be worked with the greatest care. No part of sewing marks a careful and expert seamstress more surely than does the buttonhole. The purl is made by bringing the thread from the eye of the needle around the point in the direction in which one is working, thus forming a double knot. Holding the thread so that the needle is brought through a loop makes the blanket stitch; but this does not wear nearly as well as the buttonhole stitch.

COMBINATION CORSET COVER AND PETTICOAT

The personal taste of the wearer and the amount of time and money she wishes to put into the garment determine the style and material of much of the underwear. Longcloth, French or English nainsook, Berkley cambric and crape are suitable and serviceable cotton cloths which launder

nicely and always look well. Crêpe de chine, satin, ribbons and laces are worn under thin, delicate waists and dresses. The camisole, which is in great favor in the place of the corset cover, is usually made of these more expensive materials. The envelope chemise is easily made and laundered, and is especially suitable for young girls and slender women. The kind of a dress to be worn and the prevailing fashions determine the style of the underskirt. Sateens, white wash materials, embroideries or silk are appropriate for this garment.



MIDDY BLOUSE

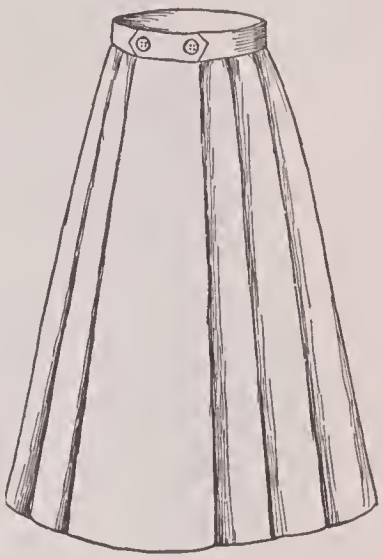
**Middy, Smock or Blouse.** If the student has followed each step of the work in the order given she has gained knowledge, skill and confidence; she will experience no difficulty in the making of the middy, smock or blouse, and is now capable of working with any kind of material. Middies and smocks are usually made of washable cotton goods, but these garments, with a simple skirt, are used for sport suits, and then the materials range from the very inexpensive cottons to silks, such as crêpe de chine or glove silk.

BLOUSE

A stamping pattern for smocking may be purchased separately or is included in the regular smock pattern. The directions for the various stitches are clear and simple, and the student should not hesitate to try any pattern, however intricate it may appear.

The lingerie blouse or shirt waist offers excellent opportunity for fine tucking and lace insets, as well as for a review of the work that has been done in making some of the previously mentioned garments.

**Outside Skirt.** A skirt to be worn with any of the foregoing garments may follow, and the middy or blouse or smock determines which material is the most suitable. The skirt may match the other garment exactly, or it may be made of wool or of a different kind of silk. If wool is chosen, plain seams, carefully overcasted, should be used, and special attention should be given to the pressing.



PLAITED SKIRT

A faced and extension placket is used in the wool material, but the one-piece placket is suitable for the thinner kinds of goods.

The seams should be entirely finished and pressed, and the skirt should be set into the band with all fastenings in place; then the garment may be placed on the wearer and the measure taken from the floor when turning up the skirt at the bottom. Do not trust to pinning to the waistline or tieing with a tape when taking this measure.

DRESS

**Afternoon Dress.** The afternoon or evening dress should be charming in its simplicity of line and decoration. In this day of exquisite weaves and patterns in all kinds of cloth, there is a great latitude of choice for this dress. The figure of the wearer is of great importance in the choosing of the material for the dress. Always remember that vertical lines appear to add to the wearer's height, and that horizontal lines seem to shorten the height. The fashion, too, changes, demanding plaids and checks at one time, and at another time plain or flowered materials. Study the market carefully in making your choice, then find a simple, becoming pattern, and the work is well

begun. All plaids and checks should be carefully matched. Let the ornament of the dress be part of it and never appear "tacked on."

**Mending.** No course in sewing could be complete without consideration of the important subject of mending. Stocking darning is skilful weaving with needle and darning cotton to supply the worn material. This prolongs the use of the stocking indefinitely, and the skilful darner is able to economize by her work more than one would expect.

The hemmed-on patch and the set-in patch are used exactly as the names indicate. Darning of dresses and table linen is an art which practice alone makes perfect. E.M.P.

Consult Wakeman and Heller's *Scientific Sewing and Garment Cutting.*

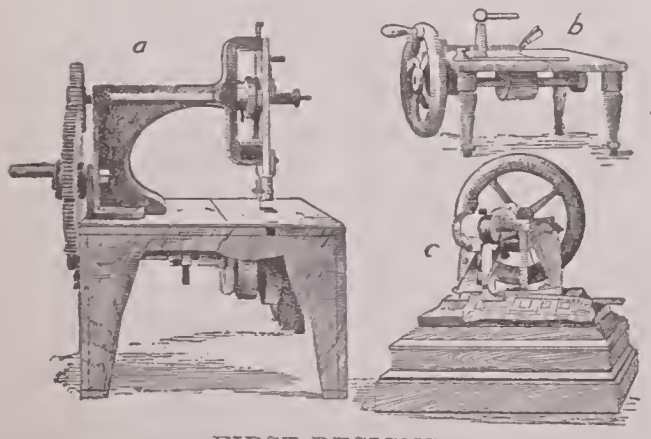
**Related Subjects.** In connection with this article on sewing, the reader may refer to the following topics in these volumes:

| | |
|---|---|
| Button | Gingham |
| Calico and Calico Printing | Industrial Art |
| | Lace |
| Costume | Linen |
| Cotton | Muslin |
| Dimity | Satin |
| Dress | Silk |
| Flax | Wool |

Also such collateral household subjects as

| | |
|---|---|
| Domestic Art | Home Economics |
| Embroidery | Household Arts in Education |

**SEWING MACHINE,** *so'ing ma sheen'*, a device that has lightened the household labors of mothers in every civilized country and made possible a stupendous development of the clothing industry. One usually thinks of Elias Howe




FIRST DESIGNS

(*a*) The Singer; (*b*) Wilson's earliest pattern; (*c*) the sewing machine of Elias Howe.

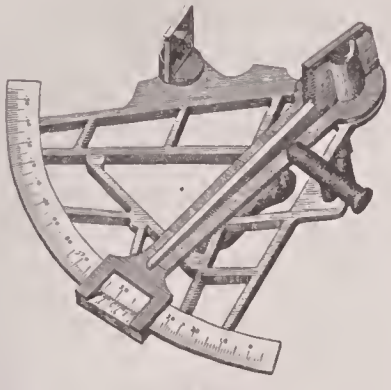
(which see) as the inventor of the sewing machine, because his model, which was patented in 1846, was the first practical machine successfully put upon the market. At least two other men, however, had previously worked out the idea of a device to take the place of hand sewing. The first, an Englishman named Thomas Saint, patented a wooden machine in 1790 which made a single-thread chain stitch. The thread was automatically fed to the needle, which had a notch instead of an eye, and an awl made holes for the needle to pass through. This machine, however, did not give practical results. Forty years later a Frenchman, Barthélemy Thimonier, patented a machine that was actually used to make soldiers' garments. The French government had eighty of his machines in use at one time, but a misguided mob of workmen wrecked the factory and almost killed the inventor, and Thimonier was never again able to create public interest in his device. He used a hooked needle that made a stitch by passing backward and forward through the cloth.

Howe's machine, upon which all double-threaded models of to-day are based, had a needle with an eye near the point. A shuttle, below the cloth, carried a lower thread on a small bobbin, and the needle was fastened to an arm that vibrated on a pivot; its movement forced the needle through the cloth, producing a lock stitch. Nearly all domestic machines of to-day are of the double-thread, lock-stitch type, though some housewives prefer the single-thread chain-stitch machine, such as the Wilcox and Gibbs. The lock stitch is much like weaving in formation, and is less likely to ravel than the chain stitch, which is something like the stitch in knitting. Of the inventors who followed Howe, A. B. Wilson and Isaac Singer deserve special mention. The former introduced the four-motion automatic feed used on nearly all modern machines, and the latter the treadle operated by foot, and a presser foot with a yielding spring, which holds the fabric down on the feed plate.

Sewing machines are now made in hundreds of varieties for every kind of sewing imaginable. Fine hand sewing and hand embroidery are being imitated by machines which will stitch in any direction; other machines do hemstitching and tucking and hemming, sometimes with twelve needles in a row on one machine; other machines make buttonholes, and still others sew on buttons. There are special machines for sewing boots and shoes, books and umbrellas and brooms. There is even a very ingenious machine for sewing carpets together; this travels along the carpet it stitches because the carpet is too heavy to be easily moved. B.M.W.

Consult Byrn's *Progress of Invention in the Nineteenth Century;* Hasluck's *Sewing Machines.*

**SEX'TANT,** an instrument for measuring the angular distance between any two points, such as the sun and the horizon. It is used most commonly by sailors in determining the position of a ship at sea.



A SEXTANT

A sextant consists of a frame supporting the graduated arc of a sixth part of a circle, a radial arm traveling over this arc, two mirrors and a small telescope. The fixed mirror is known as the *horizon glass,* because it is trained on the horizon; the movable mirror, screwed to the head of the radial arm, or index bar, is called the *index glass.* The purpose of the telescope is simply to sharpen the line of the horizon. In using the sextant, the operator, holding the plane of the arc vertical, looks through the telescope at the horizon glass, which is held at the point where earth and sky seem to meet. Then he moves the index arm until the image of sun or a star, reflected in the index glass, touches the horizon line. The sun's altitude may be read from the graduated arc, slight corrections being made for refraction and other errors.

The principle underlying the use of the sextant is a rule in optics: If an object be seen by repeated reflection from two mirrors perpendicular to the same plane, the angular distance of the object from its image is double the inclination of the mirrors. In reading the graduated arc, therefore, half degrees are taken as degrees, because what is really measured on the index is the angle between the mirrors, and this is half the distance between the objects. The position of the star in the celestial sphere being known, it is possible to determine the latitude of a ship by comparing its altitude with this position.

**SHACKLETON,** *shak''l ton,* Sir Ernest (1874- ), an Antarctic explorer, born at Kilkee, Ireland. He was sent to Dulwich College, but his love of the sea was stronger than his love of books, and he left college without finishing his course. Four times he sailed around the world before his appointment, in 1901, as third lieutenant of the National Antarctic Expedition. From 1904 to 1906 he was secretary and treasurer of the Scottish Geographical Society, and in the latter year made an unsuccessful attempt to enter Parliament from Dundee.

In 1907 Shackleton was placed in command of the British Antarctic Expedition, and landed in 1908 at Erebus Island, South Victoria Land. Here he spent the winter, sending out sledge parties of exploration. Mount Erebus was ascended, and an expedition, one of the most remarkable sledge exploits ever recorded, was undertaken over the Antarctic continent. On January 9, 1909, the party reached latitude 80° 23′, a point only 111 miles from the South Pole. The elevation here was 11,600 feet, and the wind and storms were of great violence; this fact, in conjunction with a shortage in food supplies, compelled the party to turn back when so near the goal. Shackleton was knighted on his return to England and was presented with numerous honors and medals by societies in all parts of the world.

SIR ERNEST SHACKLETON

Late in December, 1914, the explorer sailed from South Georgia, in the South Atlantic, beginning then an expedition that was destined to be one of the most thrilling in the history of polar research. The hardships and perils of this journey are described in detail in these volumes in the article Polar Exploration (page 4729). Shackleton returned to England in the spring of 1917, to aid his country in fighting the great war. He passed through the United States on his homeward journey, lecturing there to large and enthusiastic audiences.

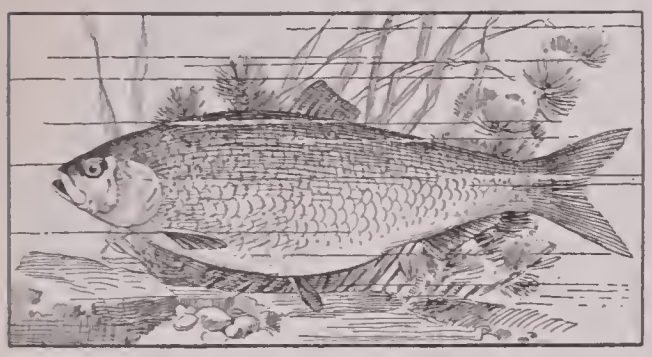
Consult Shackleton's *Heart of the Antarctic.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Amundsen, Roald | Ross, James Clark |
| Polar Exploration | Scott, Robert Falcon |

**SHAD,** an important food fish of the herring family, ranking in economic importance next to the salmon and the cod among the fish of the United States. The common, or American, shad is found from Newfoundland to Florida and has been introduced into the Pacific coast waters by the Bureau of Fisheries. It is primarily a sea fish, but ascends fresh-water rivers

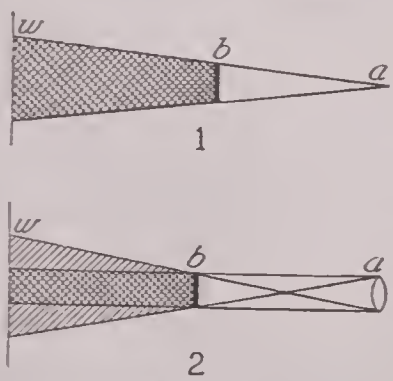
to spawn, and at that time large numbers are caught in seines or nets. Of late years the annual catch in the United States has been about 25,000,000 pounds. These fish are eaten fresh for the most part, but a few are smoked or salted in brine. Their eggs are sometimes used in making caviar (which see), as they are the best substitute for the roe of the sturgeon,



THE SHAD

commonly employed for that purpose. Shad roe when fried is considered a great delicacy. Shad are larger than herring, averaging about three pounds in weight and from two to two and a half feet in length. They are bluish above with silvery sides and have deep, compressed bodies. See HERRING.

**SHADOWS,** *shad'ohz.* When a ray of light strikes an object through which light cannot pass, that is, an opaque body, a darkened space may be seen behind the obstructing object. Such a space is known as a *shadow.* Shadows are formed constantly everywhere. We see shadows of clouds on the meadows and on bodies of water, shadows of trees and buildings, and shadows of ourselves. The light of the sun upon the earth causes our planet to throw a huge shadow into space, and when the moon passes into this darkened area it may be partially or completely eclipsed (see ECLIPSE). Both lunar and solar eclipses have to do with shadows formed on a gigantic scale.




SHADOWS

Explanation of the figures appears in the text.

The accompanying diagram illustrates the formation of shadows. In Fig. 1 the source of light is a luminous point, *a.* An opaque body *b* intercepts the ray of light from *a,* and the space between *b* and the screen *w* is in the shadow. As the light is totally excluded, the space is completely darkened, and an *umbra* is formed. In Fig. 2, *a,* the source of light, is an area of considerable dimensions. In this case the space behind *b* consists of a totally darkened region, or umbra, and of a region where only part of the light is cut off. This latter section, illustrated by oblique shading, is the *penumbra.* See LIGHT.

**SHAF'TER,** WILLIAM RUFUS (1835-1906), an American soldier, distinguished for his services as commander of land operations in Cuba during the Spanish-American War. His forces, in the course of a month's fighting, captured Santiago and the entire eastern section of the island (see SPANISH-AMERICAN WAR). Shafter was born at Galesburg, Mich., and received only a common school education. He won a Medal of Honor during the War of Secession at the Battle of Fair Oaks, on May 31, 1862, having fought valiantly throughout the entire day although severely wounded. He became major of the Nineteenth Michigan Infantry in 1862, was promoted lieutenant-colonel in 1863, became colonel of the Seventeenth United States Colored Infantry in 1864, and was brevetted brigadier-general of volunteers on March 13, 1865, for gallant conduct in action. After 1866 he was in the regular service. At the close of the Spanish-American War General Shafter was given command of the Military Department of the East, but later was transferred to the Department of the Pacific. He retired in 1901 with the rank of major-general in the regular army.

GENERAL SHAFTER

**SHAFTESBURY,** *shafts'ber i,* ANTONY ASHLEY COOPER, First Earl of (1621-1683), an English statesman who forced the passage of the Habeas Corpus Act. He rose to great prominence during the Commonwealth and after the restoration of Charles II. The son of John Cooper of Wimborne, Dorsetshire, he entered Parliament before his twenty-first birthday and showed an inclination to side with the royalists, but afterwards became one of the most decided Parliament supporters and active in the field against the king, whose final defeat he helped to bring about.

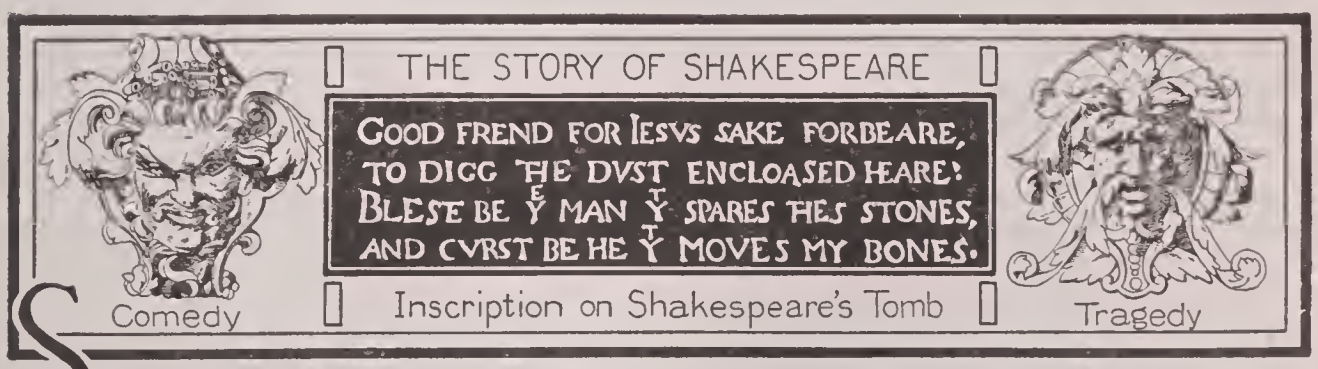
After the death of Cromwell, feeling that the people really wished for the return of royalty, he openly and strongly supported the cause of Charles II. The new king raised him to the peerage as Baron Ashley, shortly afterwards making him Earl of Shaftesbury and lord chancellor.

He was a member of the Cabal and supported the Test Acts in favor of Protestants, for which he lost his office. Through false witnesses he was given an opportunity to persecute the Catholics, and through him five peers were sent to the Tower of London and over 2,000 other persons were imprisoned. He supported the duke of Monmouth and was deserted by his friends. Later he was arrested on a charge of high treason, but released, and entered into further conspiracies until he had to flee to Holland, where he died.

**SHAH JEHAN,** *shah je hahn'* (about 1592-1666), the fifth ruler of the Mogul Empire in India, famed as the builder of one of the most beautiful structures ever erected—the Taj Mahal, a mausoleum of the emperor's favorite wife. Shah Jehan brought Mohammedan architecture in India to the height of its glory. He founded the modern city of Delhi (which see), and erected there a splendid group of buildings constituting the imperial palace; in one of the buildings stood a throne bearing a marvelously-wrought peacock's tail composed of precious stones. The Pearl Mosque, at Agra, where the Taj Mahal also is located, is another monument to his love for beautiful architecture. Shah Jehan's reign of thirty years (1628-1658) was a turbulent one, and eight years before his death he was deposed by his son Aurunzebe. An illustration of the famous mausoleum is given with the article TAJ MAHAL.

**SHAKERS,** or **SHAKING QUAKERS,** a religious sect that first appeared in England about 1747. These people were originally a branch of the Quakers, and were called Shakers because they shook their bodies during their religious services. One of their early leaders, Ann Lee, who claimed that she was the reincarnated Christ, settled in America in 1774 with a few converts and set up a small church near Watervliet, N. Y. In 1787 the society was made communistic, and was thus the first organization on that basis in the United States. The seventeen existing communities are found in New York, Massachusetts, New Hampshire, Connecticut, Maine, Ohio, Kentucky, Georgia and Florida. The largest community is at Mount Lebanon, N. Y., twenty-five miles southeast of Albany. There are probably not more than 500 Shakers at the present time in the whole country.

Shakers hold many of the views of the Quakers and, in addition, practice celibacy, hold their property in common and keep themselves separate from the world. One of Ann Lee's maxims reads: "Put your hands to work and give your hearts to God;" obeying this injunction, the Shakers have always been industrious, believing that work is a help toward attaining the sinless life which they consider to be obligatory. A Shaker village usually consists of two or more "families" of thirty or forty persons. To each "brother" is assigned a "sister," who cares for his clothing and otherwise makes him comfortable. Greatest emphasis is put upon circumspect conduct. Their religious services are not formal, but include a rhythmic march that is supposed to be a survival of the more violent "shakings" of an earlier day.




**SHAKESPEARE,** *shayk'speer,* WILLIAM (1564-1616), the greatest of English poets and dramatists, and according to most critics the greatest literary genius the world has ever known. Of his life comparatively little is known, for his own age did not regard him as a supreme genius and made no attempt to keep the record of his sayings and doings; but to-day the world would give much for such a detailed account of him. There is, however, a certain

fitness in the scantiness of the knowledge about him. It seems to confirm his right to the place apart from and above the world of petty affairs to which his genius has elevated him.

> Others abide our question. Thou art free.
> We ask and ask. Thou smilest and art still,
> Out-topping knowledge,

wrote Matthew Arnold; and while books without end have been written about Shakespeare and his works, no critic has ever felt that he has exhausted his richness or solved the mystery of his genius. For he was but a poor country boy, not well educated according to the standards of his day; yet he produced plays in great number which each generation of readers finds more wonderful than the last.

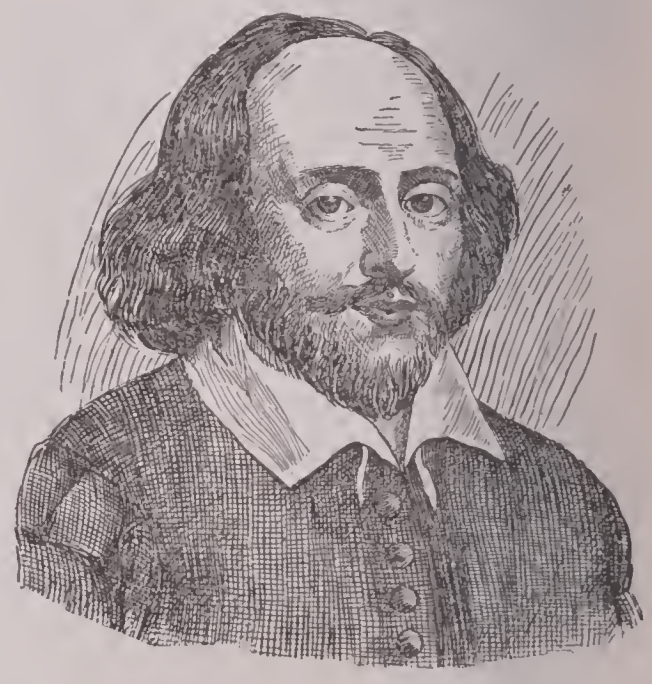
## *His Life Story*

Shakespeare was born at Stratford-upon-Avon, Warwickshire, in April, 1564. The exact date of his birth is unknown, but since it was customary to baptize babies when they were three days old, and he was baptized on April 26, there is reason for regarding April 23 as his probable birthday. His father, John Shakespeare, was a glover, but he seems also to have carried on a prosperous trade in meat, leather, corn and other agricultural produce; his mother Mary Arden, was a farmer's daughter of Wilmcote, and it seems probable, from certain documents to which she affixed her "marke" instead of her signature, that she could not write her own name.

**Youth and Training.** Of such a family, in a village which lies in the center of one of England's most beautiful regions, William Shakespeare was born, the third child and eldest son in a family of four sons and four daughters. Since his father was well-to-do, it is probable that the boy attended, between the ages of seven and fourteen, the grammar school of Stratford; somewhere, certainly, he picked up that "small Latin and less Greek" which Ben Jonson declared him to have possessed. But books were not his best teachers. The men and women around him, whether they were of high or of low estate, were to him volumes of absorbing interest, which he read eagerly and intelligently. For how else could he have made himself, what he undoubtedly was, the greatest master of the mysteries of human nature that has ever lived? The beauties of the world about him, too, he saw with observant eyes; and every "winking Mary-bud," every "morn in russet mantel clad" which left its picture on his heart and brain lives for his readers in his works.

It seems probable that when William was about fourteen his father lost his property and his official position, and that the boy had to leave school and help support the family. What his occupation was is unknown, but it seems to have been lucrative enough to have warranted him, at the age of eighteen, in marrying Anne Hathaway, a women eight years older than himself. A daughter, Susanna, was born to them in the next year (1583), and two years later twin children were christened Hamnet and Judith.

**His London Years.** In 1585, or thereabouts, Shakespeare quitted Stratford, leaving his family there. Various theories have been invented to account for this move. Some critics



SHAKESPEARE

What point of morals, of manners, of economy, of philosophy, of religion, of taste, of the conduct of life, has he not settled? What mystery has he not signified his knowledge of? What office, or function, or district of man's work, has he not remembered? What king has he not taught state, as Talma taught Napoleon? What maiden has not found him finer than her delicacy? What lover has he not outloved? What sage has he not outseen? What gentleman has he not instructed in the rudeness of his behavior?

—EMERSON: *Representative Men.*

believe, because there are numerous ironic references to marriage in the plays, that Shakespeare's own marriage was an unhappy one; but in just the same method it might be proved that his marriage was singularly happy, for he paints more than one picture of happy married life. The most plausible theory is that Shake-

speare, still a youth of twenty-one or under, got into difficulty with Sir Thomas Lucy, a local magnate, by reason of some pranks, and felt it safest to leave.

However that may be, it is certain that in time he drifted to London and joined himself to a company of players. What he did at the outset is not known—probably he served in some very minor capacity and only later began to act unimportant parts. One thing, however, is evident: in Warwickshire he had been a countryman, with all sympathy for the quiet rural life about him; in London, just as surely, he became a part of the life of the time, grasping every detail of the stirring happenings about him and storing it up for future use.

and some time later he added to his estate a considerable tract of farm land. His visits to the town became more and more numerous, and about 1611 he left London permanently and retired to Stratford.

**Last Years and Death.** The remainder of his life passed quietly with his family, and so far as can be known he wrote no more plays. In January, 1616, he made his will, in which he left to his wife the "second best bed, with the furniture." This curious bequest may by no means be taken to mean that his wife was not provided for, as by law she would have dower rights in his property.

Shakespeare died on April 23, 1616, of a fever which may have been the result of un-

THE BIRTHPLACE OF SHAKESPEARE
At left, before restoration; at right, as it appears to-day.

In 1592 appeared a reference to him in a pamphlet by Robert Greene, a popular playwright—a spiteful reference which shows that Shakespeare had become successful enough as an adapter and writer of plays to rouse envy. The years that followed brought him honor, the friendship of such men as the learned Ben Jonson and the Earl of Southampton, and a considerable measure of financial success, but not the supreme fame which later generations have conferred upon him. He himself seems to have looked upon his work as merely transient, for he made no attempt to preserve it or to collect it.

Financial success was grateful to him for one special reason. He became a shareholder in at least two of the most important theaters, but that was not the end of his ambition. All through his busy London life he cherished the desire to return to his native town and lead the life of a country gentleman. In 1597 he bought New Place, the finest house in Stratford,

sanitary drainage conditions in and about Stratford. He was buried in the chancel of Stratford church, and over his grave was placed a slab inscribed with the doggerel lines now famous the world over:

> Good frend, for Jesus sake forbeare
> To digg the dust encloased heare;
> Bleste be the man that spares thes stones,
> And curst be he that moves my bones.

That Shakespeare himself wrote these lines, as tradition asserts, there is no proof, and certainly they are woefully inadequate as the epitaph of the world's greatest poet. Later a monument with a bust was set up on the chancel wall.

Anne Hathaway survived her husband for seven years, and his youngest daughter, Judith, wife of Thomas Quiney, lived until 1661.

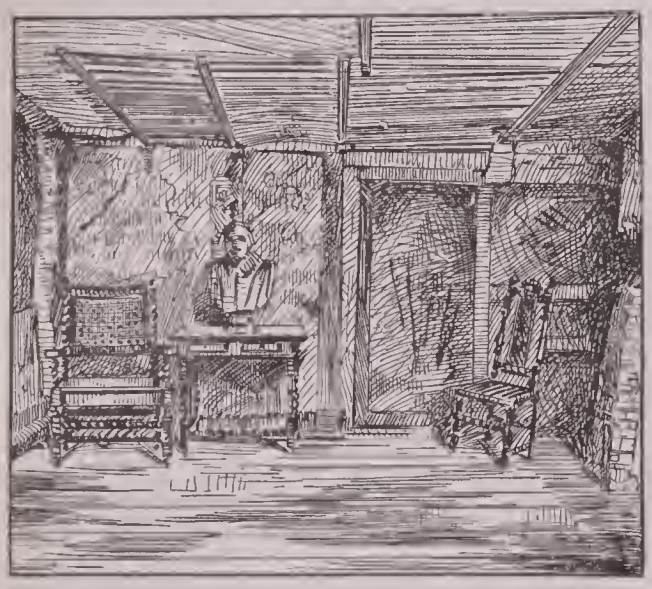
**Character.** Though we have no biography of Shakespeare left by his contemporaries, we have what is almost as valuable—a record of the impression which he made on one who knew him

well. The dramatist Jonson, whose jealousy might have blinded him to some of Shakespeare's good points, wrote enthusiastically of him, as follows:

> I loved the man and do honor to his memory, on this side idolatry, as much as any. He was indeed honest, and of an open and free nature, had an excellent phantasy, brave notions and gentle expressions.

## *The Works of Shakespeare*

**Nondramatic Works.** These were of two kinds—narrative poems and sonnets—and were in Shakespeare's own day looked upon as of greater value than his dramas. This judgment succeeding generations have by no means confirmed. The narrative poems, *Venus and Adonis* and *The Rape of Lucrece,* do indeed show much youthful imagination, but they deal with unpleasant subjects and have not the rapid movement which his dramas possess.



THE ROOM IN WHICH HE WAS BORN
Its appearance at the present day.

His sonnets, of which there are one hundred fifty-four, rank very high in sonnet literature. Few writers have dealt with love in a more masterly manner or have clothed their thoughts in more exquisite phrases. Much interest has been attached to them because they are the most personal of Shakespeare's works—the only ones, indeed, in which any touch of the poet's own feelings appears. All attempts, however, to trace them to their source in emotional events in Shakespeare's life have failed.

**Classification of the Dramas.** The simplest method of classification of these plays is a mere division of them into comedies, historical plays and tragedies. The Shakespeare critic, however, prefers to adopt a method based on chronology, because such a grouping shows the development of the creative power. In his work, thus considered, four periods stand out, which may be outlined as follows:

*First Period* (1588-1595). This was a period of experimentation and of comparative inexperience. The exuberance of imagination is evident, but the sure touch in character-drawing is absent, the plots are loosely constructed, and rhymed couplets often appear. To this period belong *Titus Andronicus* and the three parts of *Henry VI,* which are not entirely the work of Shakespeare; *Love's Labor Lost, The Two Gentlemen of Verona, The Comedy of Errors, Richard III, Romeo and Juliet* and *A Midsummer Night's Dream.* It will be seen that all three types of plays are represented in this list.

*Second Period* (1595-1600). Increased sureness of touch is noticeable in the works of this period, which also show a growing knowledge of human nature and a consequent lessening of artificiality. The plays which are usually assigned to this period are *Henry IV, Richard II, King John, Henry V, The Merry Wives of Windsor, The Merchant of Venice, The Taming of the Shrew, Much Ado about Nothing, As You Like It, Twelfth Night* and *Julius Caesar.* That is, in these five years he produced many of his greatest historical plays, one powerful tragedy, and a group of the most delightful comedies which he or any other writer ever wrote.

*Third Period* (1601-1608). This, for what reason cannot be known, was a period of gloom and horror in the poet's life, and the plays reflect his feeling. They mark the very summit of the poet's powers, and include the masterpieces *Hamlet, Othello, Macbeth, King Lear, Antony and Cleopatra* and *Coriolanus.* There

THE ANNE HATHAWAY COTTAGE

were comedies, too, so called, but they deserve the name only because they have not a tragic ending; for *All's Well That Ends Well, Measure for Measure* and *Troilus and Cressida* are to the full as dark and as bitter as the tragedies.

*Fourth Period* (1608-1611). After the storm came a season of sunshine and of a glad serenity which brightens his last plays. These were *The Tempest, The Winter's Tale* and *Cymbeline.* They are not the greatest of Shakespeare's plays—in some ways they show a falling off in his powers; but they are wonderfully pleasing in their genial, benignant attitude toward human nature.

**Sources of the Plays.** Shakespeare did not invent his plots, but took them from any old chronicle, romance, play or biography that contained the proper dramatic elements. Thus Holinshed's *Chronicles of England, Scotland, and Ireland* furnished him with the material for *Macbeth* and *King Lear,* Plutarch's *Lives* was the source of *Julius Caesar* and *Antony and Cleopatra,* some old Italian romances were the basis of *Romeo and Juliet,* and a popular account of an actual shipwreck led to the writing of *The Tempest.*

But he did not merely borrow, he re-created. To the old lifeless, dry-as-dust tales he gave a new vitality, and he made the actors in those dead dramas live as truly as the men about him on the streets. He had the most truly creative imagination of any man who ever wrote, and the fact that he found his plots ready-made in no wise lessens the truth of this statement.

**The Judgment of Time.** Why is it that readers, not only in his own country but in others as well, have acclaimed Shakespeare the world's supreme genius? Anyone who will read his plays carefully will find the answer to this question without difficulty. First of all, he is the *universal* poet; he wrote not for one race and time, but for all, because he dealt not with transient phases of life and thought but with the deep, underlying truths. No one can read his works without finding set forth there the problems, fears and hopes that make up his own emotional life. No one can read his plays without finding his outlook on life broadened and his insight into human existence made keener.

In addition, he is the greatest master of the English language, using more than twice as many words as the second greatest writer; while the variety of his style is as remarkable as his command of words. His sailors talk like sailors, his kings talk like kings; and the fact that he can present in most realistic style the very dregs of society does not prevent his rising at times to the very heights of pure poetry.

**The Shakespeare-Bacon Controversy.** It was the very excellence of Shakespeare's work which led certain writers about the middle of the nineteenth century to advance the theory that he was not really the author of the plays that

SHAKESPEARE MEMORIAL THEATER
Erected by private donations on the river bank at Stratford, in 1879. Each year since then performances of Shakespeare's plays have been given here.

were credited to him. A comparatively uneducated man could not, they argued, have produced works displaying such genius and learning. The idea caught the public fancy, and book after book appeared, championing one side or the other of the question. For the most part, those who denied Shakespeare's authorship fixed upon Francis Bacon as the real author of the plays, and supported their theory by means of some mysterious ciphers which they believed themselves to have discovered in the plays. Up to the present day the controversy has raged, and some very intelligent men have supported the Bacon claim; but practically every scholar who has been trained to judgment on such questions has rejected the evidence of the Baconians and has expressed himself as thoroughly convinced that Shakespeare and no other wrote the great dramas. A.MC C.

Consult Hudson's *Shakespeare: Life and Art;* Lamb's *Tales from Shakespeare;* Corson's *Introduction to the Study of Shakespeare;* Rolfe's *Life of William Shakespeare.*

**SHALE,** a rock having a slaty structure, and containing a large proportion of clay. Shale was deposited on the bottoms of lakes and other bodies of water in past geological ages, and when the water was drained off it hardened into rock. Under heat and pressure, shale in some localities has been changed to slate (see METAMORPHISM). Shale is one of the most common rocks of the coal measures, and it often contains valuable fossils of the plants of the coal period. Bituminous shale burns with a flame. From another variety alum is sometimes made.

**SHA'LER,** NATHANIEL SOUTHGATE (1841-1906), an American geologist, educator and author He was born in Newport, Ky. Shaler was graduated in 1862 at the Lawrence Scientific School of Harvard University, and then served two years as artillery officer in the Federal army during the War of Secession. In 1865 he became assistant in zoölogy and geology in Harvard; was appointed full professor of geology in 1887, and became dean of the Lawrence Scientific School four years later. From 1873 to 1880 he had charge of the geological survey of Kentucky, devoting part of each year to that work, and in 1884 joined the staff of the United States Geological Survey of the Atlantic Coast division. His writings embrace *Aspects of the Earth, Sea and Land, First Book in Geology, Outlines of the Earth's History* and *Man and the Earth.*

**SHAMANISM,** *shah'man iz'm,* a religion practiced by primitive peoples, based on the belief that the *shaman,* or witch doctor, can exorcise demons and spirits and so ward off evil and bring good to the persons for whom he performs his incantations. The ceremonies consist of weird feasts, dances, sorceries, etc., treatment in the case of the sick often being combined with the giving of medicinal herbs. This name was originally applied to the religion of the tribes of Northern Europe and Asia, but the North American Indians, with their "medicine man" and his uncanny rites, have similar beliefs concerning unseen spirits.

**SHAMOKIN,** *sha mo'kin,* PA., located in the rich anthracite coal region in the east-central part of the state, is a borough of Northumberland County, and a center of extensive coal-mining operations. It is forty miles northeast of Harrisburg, on the Philadelphia & Reading and the Pennsylvania railroads. Silk and knitting mills, stocking and shirt factories, wagon shops and iron works are the chief manufacturing establishments. Features of interest are a Federal building, city hall, a soldiers' and sailors' monument and Edgewood Park. The area of the borough is about one square mile. In 1910 the population was 19,588; it had increased to 21,129 (Federal estimate) in 1916.

**SHAM'ROCK,** a plant usually identified with the white clover, and always thought of in connection with Ireland, of which it is the national emblem. A familiar poem says:

It shines through the bog, through the brake and the mireland,
And he called it the dear little shamrock of Ireland.

On the British coat-of-arms are pictured the thistle, the rose and the shamrock growing on one stalk, for these are respectively the emblems of Scotland, England and Ireland. The clover believed to be the shamrock has leaves of a beautiful blue-green color, each made up of three leaflets (see panel illustration of the article IRELAND). Saint Patrick, so the story goes, chose this emblem because the three leaflets were symbolic of the Trinity. Some authorities say that the wood sorrel, whose leaves are very much like those of the white clover, is the true shamrock.

O, the Shamrock, the green, immortal Shamrock!
Chosen leaf
Of Bard and Chief,
Old Erin's native Shamrock.
—MOORE: *O, the Shamrock.*

**SHANGHAI,** *shang'hi,* a Chinese seaport in Kiangsu province which has developed into a commercial city of first importance since it was opened to foreign trade by the Nanking Treaty of 1843. (For location, see colored map, opposite page 417.) It is a city of two distinct parts —old Shanghai, with narrow, poorly drained streets and typical Oriental houses and shops, and commercial Shanghai, where are found the foreign districts, or concessions. The native section, still surrounded by its ancient walls, stretches for several miles along the left bank of the Huang-pu River; the foreign concessions, adjoining the old city on the north, extend along the river for about three-fifths of a mile. Commercial Shanghai covers 5,362 acres

and has broad, well-lighted streets, hospitals, schools, clubhouses, theaters and other modern structures. A fine esplanade, or *bund,* skirts the river bank, and an attractive park lies opposite. By means of sanitary improvements the naturally unhealthful site has been rendered safe for foreign residents.

The city is the eastern terminal of the Hangchow and the Nanking railroads, and its spacious harbor is visited by steamships from various parts of the world. At the outbreak of the War of the Nations in 1914 over 20,000 vessels were entering and clearing the port annually, and the total yearly value of imports and exports combined was nearly $270,000,000. The city has warehouses, shipyards, cotton, silk, flour and paper mills, packing houses and other manufacturing establishments. It is an important Chinese publishing center; fifty Chinese newspapers are published here. Foreigners are under the civil, criminal and political jurisdiction of their own consuls, but the courts of Great Britain are open to citizens of any nationality. The American concession has been incorporated with that of Great Britain. In 1910 the population numbered 13,436 foreigners and 413,313 natives, the largest groups of foreigners numbering as follows: 4,465 British, 3,361 Japanese, 941 Americans, 811 Germans and 330 French. In 1912 the population was estimated to be 651,000.

**SHANNON,** *shan'un,* the principal river of Ireland and of the United Kingdom, flows 254 miles through a country famous in literature. It rises at the base of Mount Cuilcagh, in County Cavan, and flows in a southwesterly direction through a series of beautiful lakes, or loughs, emptying into the Atlantic Ocean between Loop and Kerry headlands. Its main tributaries are the Fergus, Mulkear, Liffey and Deel, and in County Lanford it is joined by the Royal Canal. Killaloe, Castleconnel, Athlone and Carrick-on-Shannon are favorite places for sportsmen, as the salmon fishing is famous, and in the loughs trout are found. In the last sixty miles of its course the river becomes a tidal estuary, and at Limerick it is thirteen miles wide, making the city the most important port on the west coast. Large ships ascend the stream to Limerick, small ones to Athlone. Light-draft boats, by means of several short canals, can sail upstream to the head of Lough Allen, which is near the source of the river.

**SHARK,** a group of large, flesh-eating, deep-sea fish, ranked among the most voracious of marine animals. They are found in all parts of the ocean, but are most abundant in warm regions. Their rounded, tapering bodies, which sometimes reach a length of forty feet or more, have no scales, but are covered with rough,

FORM OF THE SHARK

horny skin, commercially called *shagreen.* This is sometimes used in place of sandpaper for polishing wood of fine grain. The mouth, because of the elongated snout, is on the under side of the head, and the animal must turn nearly upon its back when it bites its victim. In some species there are several rows of long, sharp teeth, all but one of which are folded back on the jaws, and as each set wears out, another grows to take its place. Other species have broad, flat teeth, and in a few varieties they are small. The gills of sharks communicate with the surface by several openings, and these are on the sides of the body. The tail is generally unequally notched.

Sharks are rapid swimmers, and frequently follow vessels for days at a time to secure food and waste matter thrown from them. They devour small fish of all kinds and do considerable damage to the food-fish supply. The largest species is the *whale shark,* often over fifty feet long. Next in size is the harmless *basking shark,* found chiefly in the Arctic Ocean and so-called because it is known to bask in the sun on the surface of the water. One of the best-known species is the *white shark,* a man-eater living in tropical seas and sometimes found off the southern coasts of the United States. The *blue shark,* named from its color, also preys on man; it is a gluttonous fish which often follows its prey into the nets of fishermen.

Some of the sharks are called *hammerheads* because the head is shaped like a hammer, with the eyes at either end. Among many other species are the *dusky, porbeagle, spinous, angel* and *dog* sharks.

**Shark Fishing.** On Lapland and Norwegian coasts, as well as those of China, India and Africa, shark fishing is an important industry, but it has not as yet been developed in the United States. In Norwegian waters sharks are caught about 150 miles from land. Where the fishing boat is stationed a barrel pierced with

holes and filled with oil is sunk; as the latter escapes it attracts the fish, which are caught by chains and hooks baited with salted seal meat. As soon as a monster is hooked it is stunned by a heavy blow on the head.

In some countries sharks' flesh is used as food. Abundant oil is taken from the livers, and in China the fins, from which gelatin and soups are made, are in great demand. M.K.

Consult Dean's *Fishes, Living and Fossil.*

**SHARON,** *shair'un,* Pa., a borough in Mercer County, north of the center near the west state boundary line, seventy-five miles northwest of Pittsburgh. It is on the Shenango River and on the New York Central, the Erie, the Pennsylvania and the Pittsburgh & Lake Erie (freight only) railroads and has electric interurban service. Here is located Hall Institute, a Baptist school. The industrial establishments of the borough include stone quarries, boiler and machine shops, rolling mills, ordnance works and manufactories of explosives, nails, horse collars, stoves, chains and lumber products. There is also considerable trade in coal. Sharon was settled in 1795, and was incorporated as a borough in 1841. The population, which in 1910 was 15,270, had increased to 18,616 (Federal estimate) in 1916.

**SHAS'TA,** Mount. In the northern extremity of the beautiful Sierra Nevada range of California there rises a lofty, snow-covered, conical mountain, which towers to a height of over 10,000 feet above the plains of the Sacramento Valley. This mountain, dominating the whole landscape, is Mount Shasta. (See illustration, in article California.)

Mount Shasta is a typical volcanic mountain, attaining a height of 14,350 feet above sea level, and is formed of two peaks. The western, 12,900 feet high, known as Crater Peak, or Shastina, has at its top a crater about three-fourths of a mile in diameter and 2,500 feet in depth. Mount Shasta is a remarkable product of the great volcanic activity—traces of which are so abundant in the whole Sierra Nevada range—to which this region was subjected in the remote past. On its northern slope are several glaciers, some of considerable size. A number of these are found at as low an altitude as 9,500 feet, while on other mountains glaciers are seldom at a lower altitude than 11,000 feet.

These glaciers are only the remnants of the numerous large glaciers which in a former geological age covered the summits of these mountains. They have left indelible evidence of their existence in the numerous valleys and amphitheaters with their towering walls and in the thousands of glacial lakes and ponds.

Consult Muir's *Picturesque California* and his *The Mountains of California.*

**SHAUGHNESSY,** *shaw' ne si,* Thomas George, First Baron (1853- ), a Canadian railroad executive, president of the Canadian Pacific Railway. Shaughnessy was born at Milwaukee, Wis. As a boy of sixteen he began railroading with the old Milwaukee & Saint Paul Railway and later with the Chicago, Milwaukee & Saint Paul. In 1882 he entered the employ of the Canadian Pacific Railway as general purchasing agent. Later he became in turn assistant general manager, assistant to the president, vice-president and finally, in 1898, president. His prominence in railroad affairs led to his election as officer or director in various industrial and financial corporations. He was knighted in 1901, and in 1916 was raised to the peerage as Baron Shaughnessy of Montreal [Canada] and Ashford [County Limerick, Ireland].

**SHAUNAVON,** *shaw'na von,* a town in southern Saskatchewan, a division point on the Weyburn-Lethbridge branch of the Canadian Pacific Railway. It is 230 miles west of Weyburn, eighty-four miles east of Altawan, at the Alberta-Saskatchewan boundary, and about 175 miles east of Lethbridge. Shaunavon is the market and distributing point for a wheat-growing and ranching country which is being opened up by the Weyburn-Lethbridge line. It has numerous general stores, lumber yards, grain elevators and a flour mill. The town was founded in 1914. Population in 1916, estimated, 1,200.

**SHAW,** Albert (1857- ), the founder and editor of the *American Review of Reviews,* was born at Shandon, Ohio. He was graduated at Iowa College (now Grinnell) in 1879, spent several years as an editorial writer on the Minneapolis *Tribune,* in study abroad, and as professor of international law at Cornell University, before he began editing the *Review of Reviews,* in 1891. Since that time he has proved that as an editor of a current-events magazine he has few equals. He has also an established reputation as a writer on economics and municipal government, and is the author of *Coöperation in the Northwest, Local Government in Illinois, Municipal Government in Great Britain, Municipal Government in Continental Europe, Cartoon History of Roosevelt's Career* and other books.

**SHAW,** Anna Howard (1847- ), an American physician, minister, lecturer and writer, active in many fields, but especially identified with the woman suffrage movement. Though born in England, at Newcastle-on-Tyne, she has resided in America from early childhood, and was educated in that country at Albion (Mich.) College and at the Boston University schools of theology and medicine. She holds a degree of doctor of medicine, and is a regularly ordained minister, having received ordination from the Protestant Methodist Church in 1880. Dr. Shaw was pastor of Methodist Episcopal churches in Massachusetts for a number of years, but the rules of that denomination forbade her receiving ordination to its ministry. From 1886 to 1904 she was national lecturer for the National American Woman's Suffrage Association, and was its president from 1904 until 1915. In the latter year she resigned that she might devote her energies to an active campaign for the enfranchisement of womn.

ANNA HOWARD SHAW

After the entrance of America into the War of the Nations she announced her disapproval of the "heckling" tactics adopted by the militant leaders of the suffrage movement, and gave her loyal support to the government, becoming chairman of the Woman's Advisory Committee of the Council of National Defense. Dr. Shaw has the unique distinction of being the only woman who has preached in the state church of Sweden, the Gustav Vasa Cathedral, and she was the first ordained woman to preach in the various European capitals. Her autobiography, *The Story of a Pioneer,* was published in 1915.

**SHAW,** George Bernard (1856- ), a British dramatist, novelist and critic, born at Dublin, Ireland. He attended school in his native city, but his education was not very extensive, for by his fifteenth year he had begun to earn his own living. In 1876 he went with his family to London, where he did office work of various kinds until able to support himself by literary work. Shaw was much interested in socialism and used his talents in every way possible to advance it, speaking on street corners, contributing articles to magazines, and making it the central theme of his novels. There were four of these—*The Irrational Knot, Love Among the Artists, Cashel Byron's Profession* and *An Unsocial Socialist;* they met with only a fairly favorable reception. His dramatic and musical articles for various London journals were more successful, however, and his defense of Ibsen and of Wagner in *The Quintessence of Ibsenism* and *The Perfect Wagnerite* attracted wide attention.

GEORGE BERNARD SHAW

Shaw's first play, *Widowers' Houses,* was produced in 1892. It was followed by a series of plays, including *Mrs. Warren's Profession, The Philanderer, Arms and the Man, You Never Can Tell, Candida, The Devil's Disciple, Caesar and Cleopatra, The Shewing-up of Blanco Posnet* and *Fanny's First Play,* which have perhaps aroused more discussion than those of any other author. Shaw is always clever and usually satirical, and his satire on the shams and hypocrisies of society is often stinging. Nevertheless, he is so fond of paradox that he is often taken for a mere humorist rather than a satirist.

Consult Henderson's *Shaw: His Life and Work;* Howe's *George Bernard Shaw.*

**SHAW,** Henry Wheeler (1818-1885), an American humorist, more familiarly known by his pen name Josh Billings, was born at Lanesborough, Mass. He attended Hamilton College for a year, but left school to go West, where he engaged in various occupations for twenty-five years. Returning in 1858 to Poughkeepsie, N. Y., he became an auctioneer, and wrote several humorous articles for newspapers in that city, but for some time received little attention as a writer. When, however, he began to use his queer, "backwoods" diction, spelling words to sound just as he pronounced them, his articles became immensely popular. For many years the *New York Weekly* published Shaw's contributions, and in 1863 he went on the public platform, where, with his

droll sayings and quaint moral lectures, he was very successful. In 1866 his first book, *Sayings of "Josh Billings,"* was published, and had a sale of many thousand copies. This was followed by *Every Boddy's Friend* (1876), *Josh Billings' Trump Kards* (1877), *Josh Billings' Spice Box* (1881) and others along that line, and he also published yearly *Josh Billings' Farmers' Allminax.*

**SHAWENEGAN,** *shaw'en e gan,* **FALLS,** a town in Saint Maurice County, Quebec, noted for the near-by falls of the Saint Maurice River and for the aluminum and manganese manufactured there. Shawenegan Falls is on the west bank of the Saint Maurice River, and on the Canadian Pacific and Canadian Northern railways. By rail it is twenty-one miles northwest of Three Rivers, 116 miles northeast of Montreal and ninety-eight miles southwest of Quebec. The falls of the Saint Maurice are 165 feet high and are capable of developing 200,000 horse power. In addition to aluminum and manganese, the town's chief products are paper, wood pulp and carbide. Population in 1911, 4,265; in 1916, estimated, 5,000.

**SHAWNEE,** *shaw ne',* an Indian tribe of the Algonquian family. The Shawnee were first known to white men about 1670, when they were living along the Savannah River in South Carolina. Later they spread out into Tennessee, Kentucky, Pennsylvania and Ohio. They were a strong, warlike tribe, superior in intellect, and very courageous. Tecumseh, their most celebrated chief, fiercely opposed the advance of white settlers upon Indian soil and harassed them continually. In 1812 he led the Shawnee against the Americans, but his death dispirited his people, and their later history is a record of treaties and movements westward. The remnant of the tribe, numbering about 1,400 persons, lives in Oklahoma. See TECUMSEH.

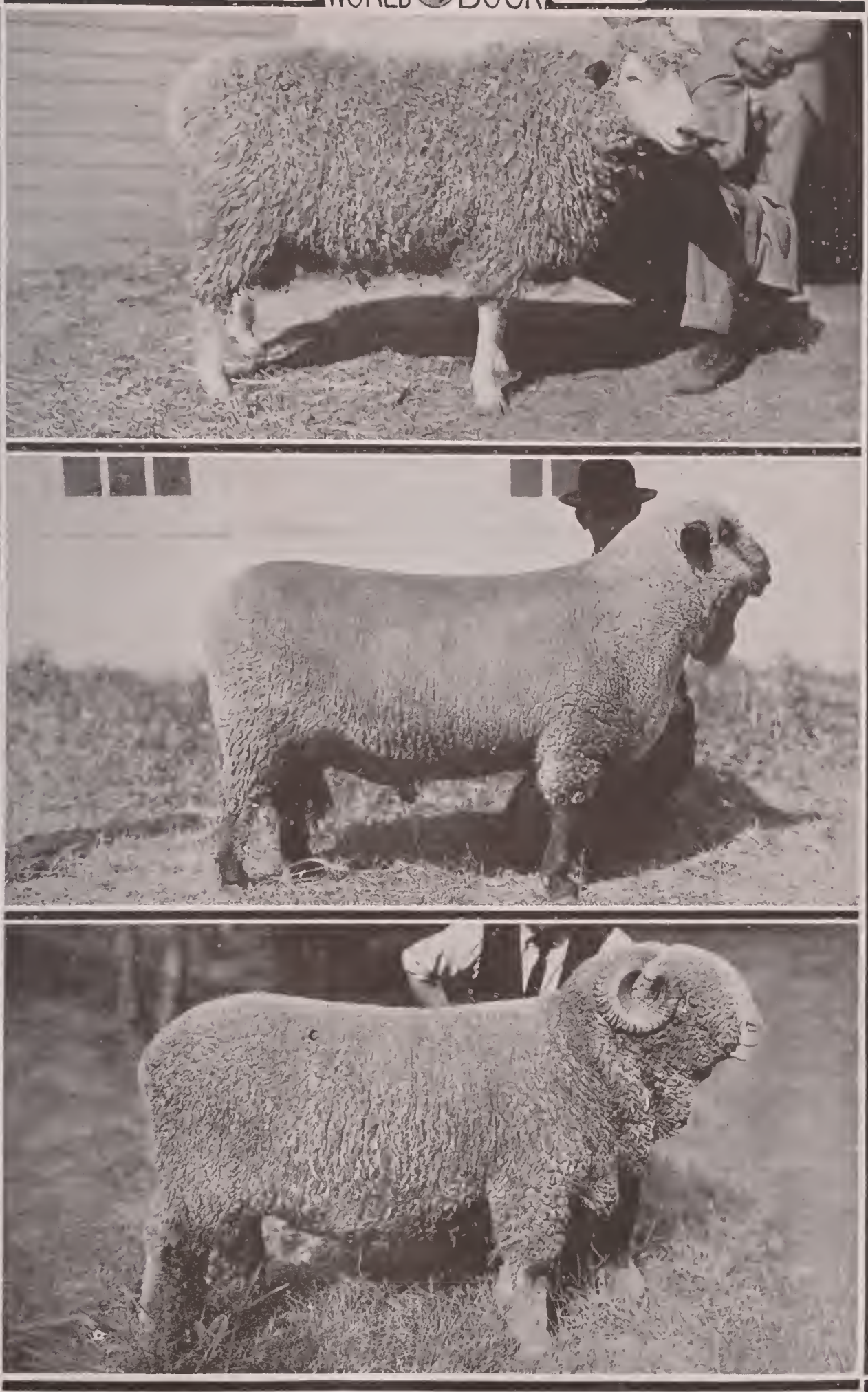
**SHAWNEE,** OKLA., a city in Pottawatomie County, centrally located in the state, thirty-seven miles southeast of Oklahoma City and 448 miles west of Memphis, Tenn. It is on the North Canadian River, and on the Atchison, Topeka & Santa Fe, the Chicago, Rock Island & Pacific, both of which have shops here, and the Missouri, Kansas & Texas railroads. The population, which was 12,474 in 1910, had increased to 18,138 (Federal estimate) in 1916. The area of the city is more than two square miles.

The principal features of Shawnee are the Baptist and Catholic universities, the city hall, a convention hall, a $125,000 high school, Carnegie Library, city hospital and several attractive parks. In the surrounding agricultural country corn, alfalfa and cotton are the leading crops. Oil has been discovered in paying quantities near the city. Besides its railroad shops, Shawnee has cotton gins, a milling company doing an annual business worth $2,000,000, and a garment factory whose annual production is valued at $300,000. The place was settled in 1895 and the next year became a city.

**SHAYS' REBELLION,** an uprising in 1786-1787 in Western Massachusetts, based upon the discontent over financial conditions at the close of the Revolutionary War. Excessive salaries of office holders, abuses in the administration and the exorbitant land taxation were the principal grievances. About 600 insurgents, under Daniel Shays, gathered at Springfield in September, 1786, and intimidated the supreme court, which adjourned after three days. Disturbances continued, and on January 25, 1787, Shays led an army of 2,000 men against the Federal arsenal at Springfield. The state militia soon overwhelmed them, and by the end of February the revolt was quelled. Fourteen of the ringleaders were sentenced to death, but they were later pardoned by the governor of Massachusetts, John Hancock.

**SHEBOY'GAN,** WIS., an important shipping point and industrial center, and the county seat of Sheboygan County, is situated on Lake Michigan, at the point where it receives the waters of Sheboygan River. Manitowoc is twenty-eight miles north, Milwaukee is fifty-two miles south, and Chicago is eighty-four miles farther south. Steamers communicate with the principal lake ports and there is regular service between Chicago, Milwaukee and Sheboygan. The Chicago & North Western Railway provides inland transportation and an electric line extends to Elkhart Lake, a summer resort in the vicinity. Sheboygan was settled in 1835, was incorporated as a village in 1846 and as a city in 1853. Germans comprise the greater part of the population, which had increased from 26,398 in 1910 to 28,559 (Federal estimate) by 1916. The area of the city is nearly five square miles.

Sheboygan is the commercial center for a large agricultural and dairying region. There are coal and salt docks, and several big warehouses, five of them being for cheese alone. The city is noted for its extensive manufacture of chairs, about 2,000 people being employed in the five factories. Tanneries, enameling



**SHEEP.** From top to bottom: Lincoln ram, mutton sheep, long wool class. Shropshire Down ram, mutton sheep, medium wool class. Rambouillet ram, class "C" type of Merino.

plants, toy and broom factories, machine shops, breweries and furniture factories are included among a great variety of other establishments. The state fish hatchery is at Sheboygan. Noteworthy buildings are the post office, the new city hall, courthouse, Holy Name Church, Saint Clement's Church, which cost $85,000, the county insane asylum, Saint Nicholas Hospital and a home for the friendless. In addition to the public and parochial schools there are a business college and a Carnegie Library. The city has a fine beach and three parks, one of which, Fountain Park, contains a mineral salt well.

**SHEEP.** Sheep are among the most useful of domestic animals. Their wool is made into clothing, their flesh and milk are used for food, and from their skin leather is made. The sheep is a cud-chewing animal, and is closely related to the goat and the ox. It was one of the first animals to be domesticated. The Bible contains many references to sheep and shepherds; since the days of the Hebrew nation the lamb has been regarded as the emblem of innocence.

Probably all wild sheep had horns, but these have now disappeared from the ewes of all but the horned Dorset breed, and from rams in most breeds. The horns are hollow like those of the ox, and on the rams they curve in the form of a spiral. Wild sheep are still found in the mountain regions of Asia, Europe and America. The Bighorn of the Rocky Mountains is the best known wild species. This sheep has been nearly exterminated by hunters, but it now finds safety in the game preserves of the United States and Canada, and its numbers are slowly increasing.

Australia, New Zealand, the Union of South Africa, Argentina, Uruguay, Russia, the United Kingdom, France, Spain, India and the United States are the chief wool-growing countries of the world. In the United States, Montana, Wyoming, New Mexico and Ohio are the leading states. There are about 50,000,000 sheep in the United States, and about 9,000,000 are slaughtered annually for their meat. The yearly production of wool is about 290,000,000 pounds. The number of sheep in Canada exceeds 2,000,000. Those raised in the United States and Canada belong to breeds imported originally from Europe.

VARIETIES OF SHEEP
(*a*) Lincoln ram; (*b*) fat-tailed sheep; (*c*) Shropshire ram; (*d*) Merino ram.

**Domestic Breeds.** All breeds can be classified under two general types—the mutton type and the wool type. Those of the mutton type have large bodies and wool of a coarse or medium grade. The following are the most valuable mutton-type breeds:

The *Southdown,* which was named from the South Downs in England, is characterized by a compact body of medium size, wool of a medium grade of fineness and brownish-gray face and legs. The Southdown is the best general-purpose sheep raised in America, where it is

very popular. The *Hampshire* is somewhat larger than the Southdown, and the face and legs are darker, in some instances being almost black. The *Shropshire* also resembles the Southdown, but the body is larger and the wool longer. The *Cotswold* is noted for its long, coarse wool. The size is about the same as that of the Southdown, and the face and legs are white. Two other large white-faced breeds are the *Leicester* and the *Lincoln*, but these are not common in the United States.

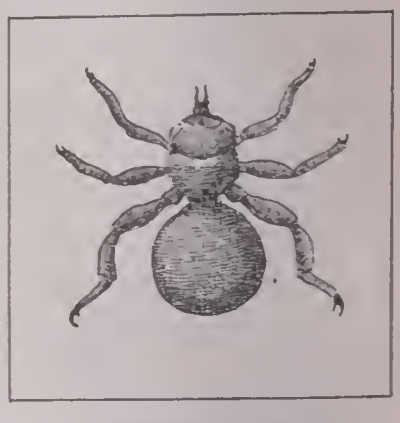
All breeds of the wool type have sprung from the Spanish *Merino*. These breeds are characterized by small bodies, with large folds of skin or wrinkles about the neck and shoulders. The wool is short, fine and compact, contains a large percentage of oil and covers the face and legs. These sheep will not thrive on lowlands nor in a damp climate, but they are raised in large numbers in the arid grazing regions of the Canadian Northwest, and in Montana, Wyoming and New Mexico. The original Merino has been modified by cross breeding until a somewhat larger and more hardy animal has been produced. The Merino

THE SHEEP OF THE WORLD
The ten countries showing greatest production.

is also raised in large numbers in Australia, New Zealand and Argentina. The *Rambouillet*, imported from France, is larger than the Merino and is becoming very popular among American sheep growers.

**Diseases.** Sheep are subject to many diseases, but scabies, or scab, is by far the most prevalent and the most destructive. The disease is caused by a mite which lives next the skin on those parts of the body where the wool is thickest. The mites bore through the skin and cause the scab. The disease is highly contagious, since the mites crawl from one animal to another. The remedy consists in dipping the sheep in a bath prepared by using one pound of tobacco and one pound of sulphur to six gallons of water, and allowing the mixture to stand for several hours before using. Scab has become so prevalent that the United States government has enacted stringent laws for its treatment and prevention. Other common diseases are grub in the head, caused by a fly, and lip and leg ulceration.

**Sheep Ticks.** The sheep tick is a wingless fly which lives on the bodies of the animals, obtaining its nourishment by boring through the skin and sucking the blood. The wound causes a slight swelling which itches and burns worse than a mosquito bite. Sheep infested with ticks do not thrive, and the loss caused by them is loss in the production of flesh and wool, since the animal seldom dies. The sheep-grower destroys ticks by dipping the sheep in the same solution as is used for the scab. The tick has a short body, flattened above and below, a tough brown skin and six legs, each provided with two sharp claws. The mouth is a tube armed at the end with teeth, which are used in piercing the skin.



SHEEP TICK

W.F.R.

Consult Shaw's *Management and Feeding of Sheep;* Wing's *Sheep Farming in America:* Clarke's *Modern Sheep: Breeds and Management.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

Bighorn
Mange
Meat and Meat Packing
Mutton
Wool

**SHEEP LAUREL,** *law'rel.* See KALMIA.

**SHEFFIELD,** *shef'eeld,* a city in Yorkshire, England, 165 miles northwest of London, celebrated for 200 years as the manufacturing center of the world's finest cutlery. To-day other parts of the world equal it. The city is pleasantly situated on wooded slopes surrounding the point where the River Sheaf meets the Don, and is a progressive, well built municipality of over 450,000 inhabitants. The working people are excellently provided for in Sheffield, with its public baths, free libraries, parks and technical schools. The city owns and operates its tramways, electric lighting plant and markets, and has numerous churches and trade and art schools, and a university founded in 1905. Among its interesting buildings are the

parish church, dating from the reign of Henry I, the town hall, Saint George's Museum (founded by Ruskin) and Albert Hall, with a seating capacity of 3,000. The fine botanical gardens are visited by all tourists. Besides the thriving cutlery establishments, the city has factories producing bicycles, boilers, stoves, railway springs, ties and rails and other commodities. In an old castle of Sheffield, demolished in 1644, Mary Queen of Scots spent twelve years as a prisoner. The place was chartered by Edward I and was constituted a city in 1893.

**SHEIK,** *sheek,* an Arabic title, used very loosely, but always meaning a venerable, aged man or a chieftain. It may be the term applied to the head man of a village, the chief of a tribe, the leader of a religious order, or simply a person who is old and highly respected; its use down to this day is restricted, as it was centuries ago, to the Arabs and to their religion, Mohammedanism. The power of a sheik depends wholly upon the character and influence of the individual to whom the title is given. The most powerful sheik is the so-called *grand mufti,* the head of the Mohammedan Church in the Turkish Empire, located at Constantinople.

**SHEKEL,** *shek''l.* This word, so frequently used in the Bible, meant most anciently a unit of weight, though later it referred as well to a coin. As a weight it was first employed in Babylonia, but its use spread to the Phoenicians and the Hebrews, each of whom, however, modified its value. The Hebrew shekel, to which references are most common, weighed 14.1 grams, or 218 grains. Intrinsically, the gold Hebrew shekel was worth about $10, the silver between sixty and seventy-five cents, though of course the purchasing power was far in advance of such sums to-day. For even while it was but a unit of weight, long before any Hebrew coins were minted, the shekel was used as a medium of exchange, uncoined ingots of gold or silver of known weight being employed.

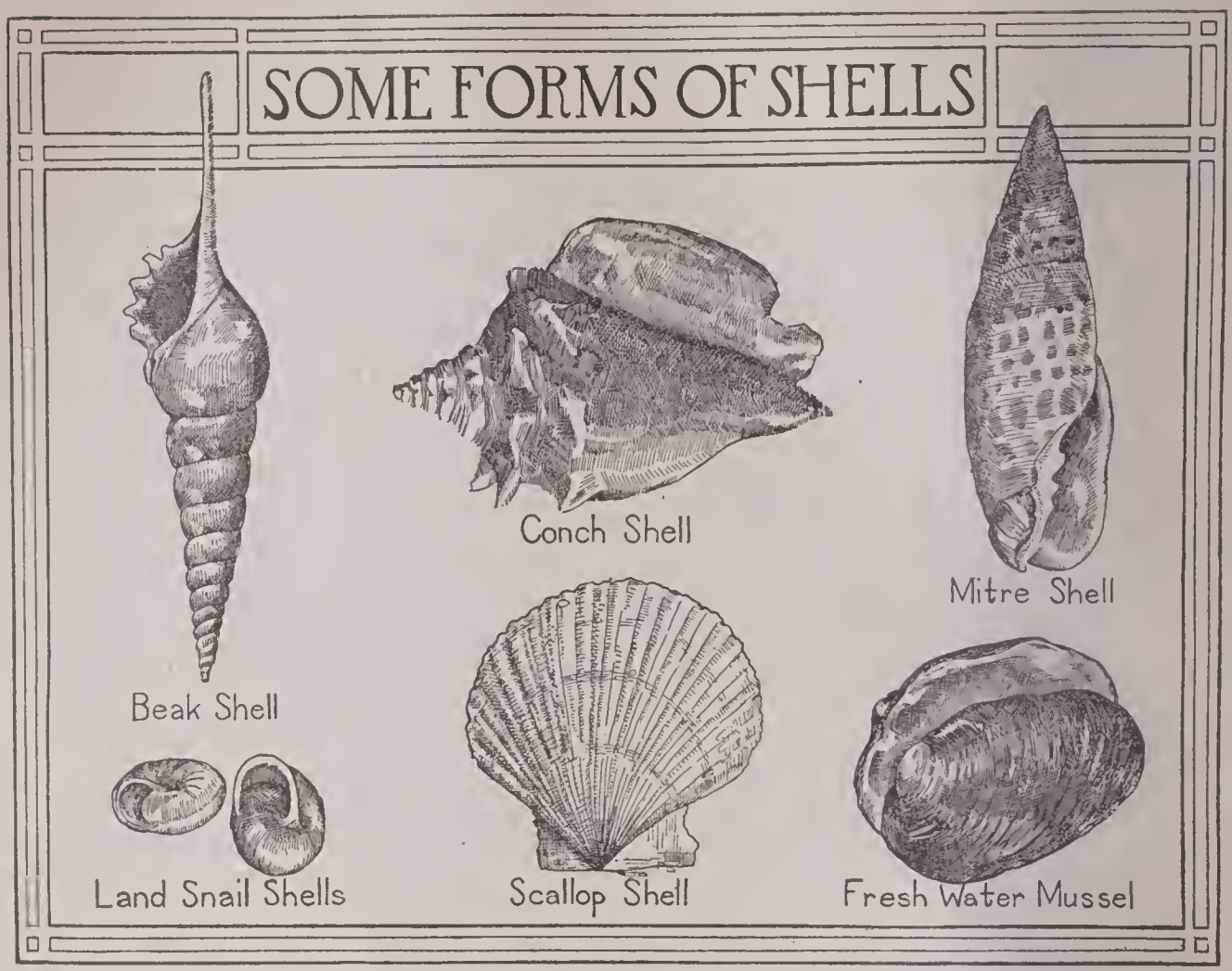
In the time of Simon Maccabaeus the Jews first issued coins of their own, and it is probable that the first ones were struck between 141 and 134 B. C. This is by no means certain, however, as these early Jewish coins bear no date. The most important of these coins was the silver shekel, which weighed between 212 and 220 grains and was of about the diameter of a United States cent. Upon one side was the representation of a chalice, probably a pot of manna, with the words *Shekel of Israel;* while on the other was the legend *Jerusalem the Holy,* surrounding a flower device, presumably Aaron's rod that budded. Half shekels were also coined.

In loose language of the present day the term *shekel* has come to refer to money in general.

**SHELBYVILLE,** *shel'bi vil,* IND., the county seat of Shelby County, and a center of furniture manufacturing, situated twenty-six miles southeast of Indianapolis and eighty-six miles northwest of Cincinnati, at the junction of the Big Blue and Little Blue rivers. It is served by the Cleveland, Cincinnati, Chicago & Saint Louis and the Pittsburgh, Cincinnati, Chicago & Saint Louis railroads and by electric interurban lines. In 1910 the population was 9,500; it was 10,965 (Federal estimate) in 1916. The area is nearly two square miles. Shelbyville has a county courthouse, a city hall, Carnegie Library, the Major Memorial Hospital and a Masonic Temple. Furniture is made by sixteen factories. Other plants produce flour, brick, carriages, glue, baking powder, mirror screen for picture shows and other commodities. Shelbyville was settled in 1822. It was the birthplace and home of the novelist Charles Major, author of *When Knighthood Was in Flower.*

**SHEL'DON,** CHARLES MONROE (1857- ), an American clergyman and author. He was born at Wellsville, N. Y., educated at Brown University and Andover Theological Seminary, and in 1886 ordained in the Congregational ministry. From 1886 to 1888 he preached at Waterbury, Vt., and from 1889 to 1912 at Topeka, Kan., but in the latter year resigned his pastorate to take part in an antisaloon campaign in New Zealand. In 1900 his name came prominently before the public when for one week he edited the Topeka *Daily Capital* on what he felt were strictly Christian principles. Sheldon's works, some of which have been very popular, include *Robert Hardy's Seven Days; The Crucifixion of Philip Strong; His Brother's Keeper; In His Steps,* by far the best known and most widely discussed; *The Miracle at Markham; Who Killed Joe's Baby?* and *The Narrow Gate.* He has also edited various works of a religious character. There is the spirit of the crusader in nearly everything he has written; he uses a book to drive home to the reader a great spiritual or moral principle.

**SHELL,** the hard covering of the bodies of mollusks and of various other groups among the lower animals. The mollusks are the typ-




ical shell builders, and no other animal group is so widely distributed. Their shells are found not only along the ocean borders and in the sands of the lake shores, but in low inland plains, in swamps and even on high mountains. These animals build their shells not as bees make combs of wax; the fleshy covering of the body, or mantle, secretes lime from the water, and layer by layer the limy substance is added to the growing shell. The latter is protected from the corrosive action of acids in the water by a horny, outer skin and a pearly lining. The shells of mollusks are divided into two classes —the *univalve,* or those of one piece, and the *bivalve,* those consisting of two parts joined by a hinge.

Of the first class, the graceful spiral or wheel-like shells of the snails are most common, some being delicate, lustrous and pearly, others, heavy, thick and dull. The single-piece shells include also the rose-lipped covering of the conch, a mollusk abundant on the Florida coast; the cowrie shells which the child holds to his ear to hear the sound of the sea; the long, spindle shells of the warm waters of the Pacific and the California shores; the handsome trumpet shells and giant whelks of the Atlantic; the tiny rice shells and the helmet and cone shells of Southern United States. The chambered nautilus of the deep seas, which each year adds to its spiral shell a new chamber for which it forsakes the old one, is another interesting univalve mollusk.

Clam and oyster shells are the most common bivalve shells, and the latter are also of great commercial importance because of their inner layer of pearl, called mother-of-pearl.

**Uses of Shells.** Buttons, buckles, knife handles and many other articles are made from the pearly lining of the oyster shell, and a large amount of white pearl is also obtained from the fresh-water mussels of the Mississippi River, especially between Quincy, Ill., and Prairie du Chien, Wis., and in the adjacent waters. Over six billions of pearl buttons are annually manufactured in the United States. Mother-of-pearl is also extensively used for inlaying fancy boxes, musical instruments, furniture and wall panels, and as a covering for opera glasses, card cases, etc.

The beautiful greenish and rosy-hued abalone shell, found in the California coast waters, is combined with the white pearl in inlay work and is also mounted in silver for jewelry or

carved into cameos, and the large shells are used as ornaments. They can be seen from the glass-bottomed boats near Catalina Island, where about $40,000 worth are annually sold.

Pulverized conch shells are used in the manufacture of porcelain, and many of the large and beautiful varieties are prized as ornaments. A flat, thin shell found in the Pacific and Indian oceans, so transparent that print can be read through it, is commonly used in the Philippine Islands as a substitute for window glass. In Africa and India, the small cowries furnish a ready-made currency requiring only to be strung. They are the only currency of the natives of the Sudan in Africa, and traffic in these shells on the west coast of Africa has made fortunes for the Dutch and English traders, who exchange them for palm oil and ivory. A scallop shell worn by the pilgrims of the Middle Ages, to show they had crossed the sea to the Holy Land, came to be known as *pilgrim shell*. These shells were frequently adopted as heraldic devices by families whose ancestors had made the pilgrimage. E.B.P.

**Related Subjects.** For further information on the subject of shells the reader is referred to the following articles, many of which are illustrated:

| | |
|---|---|
| Abalone | Mollusks |
| Cameo | Mussel |
| Clam | Nautilus |
| Conch | Oyster |
| Cowrie | Scallop |
| Mother-of-pearl | Snail |

**SHELL,** a term used collectively to describe the various projectiles fired from big guns. There are many different forms of shell, varying in shape, size and composition, according to the purposes for which they are intended. Ordinarily, a shell is a hollow projectile filled with explosive powder, or powder and bullets, which scatter when the charge is exploded by a fuse set for this purpose. Shells are now usually made of steel or copper.

The shells used by armies on land are quite different from those used in naval warfare. On land it is seldom that the shell is required to penetrate any metal defenses, except when permanent forts are attacked, so the metal of which they are composed does not go through the hardening processes necessary for shells intended to pierce the armor plate of vessels.

In the War of the Nations, beginning in 1914, the shell chiefly used was shrapnel, except when the biggest guns were battering down forts by sheer weight of metal. The smallest shrapnel shell is that used in field guns, which in the French, German and British armies are guns of approximately 3-inch caliber. The weight of the shell varies according as it is a high- or a low-velocity shell. A gun will send a light shell a great distance at high velocity, and it will send a heavier one perhaps as far but not as quickly. The French and German high-velocity shells weigh sixteen pounds. The British usually fire from the 3-inch gun a shell of eighteen and one-half pounds weight for field artillery and thirteen pounds for horse artillery. The shell contains from 250 to 363 bullets, which are discharged by the bursting of the shell. The charge for firing a shell of sixteen pounds is 4.61 pounds of explosive containing forty per cent nitroglycerine (these figures referring to one of the latest Krupp guns). The following table illustrates the weight of shell and weight of charge fired from six patterns of Krupp ordnance:

| CALIBER: INCHES | WEIGHT OF GUN: TONS | WEIGHT OF CHARGE: POUNDS | WEIGHT OF PROJECTILE: POUNDS | RATE OF FIRING | PERFORATION (WROUGHT IRON) |
|---|---|---|---|---|---|
| 12.1 | 52.0 | 357.0 | 981.0 | 2-3 per minute | 53.1 inches |
| 9.45 | 25.45 | 173.6 | 474.0 | 3-4 " " | 42.0 " |
| 7.48 | 12.64 | 86.2 | 235.9 | 5-6 " " | 33.1 " |
| 5.91 | 6.1 | 41.7 | 112.4 | 6-8 " " | 26.1 " |
| 4.13 | 2.13 | 14.55 | 39.7 | 20-25 " " | 18.3 " |
| 3.54 | 1.45 | 7.94 | 25.13 | 25-30 " " | 15.6 " |

The following table shows the same particulars concerning ordnance in use by the United States navy:

| CALIBER: INCHES | WEIGHT OF GUN: TONS | WEIGHT OF CHARGE: POUNDS | WEIGHT OF PROJECTILE: POUNDS | RATE OF FIRING PER MINUTE* | PERFORATION (WROUGHT IRON) |
|---|---|---|---|---|---|
| 13 | 61.4 | 480 | 1,130 | ..... | 31.8 inches |
| 12 | 56.1 | 340 | 870 | ..... | 52.0 " |
| 10 | 34.6 | 207.5 | 510 | ..... | 38.0 " |
| 6 | 8.6 | 37.0 | 105 | ..... | 23.5 " |
| 4 | 2.9 | 12.3 | 33 | ..... | 11.0 " |

*Figures as to rapidity of fire are not available, but it may be assumed that the rate of fire is at least equal to that of European guns of the same caliber.

**Siege Gun Projectiles.** For siege guns, intended to batter down forts and permanent positions, great weight of metal is needed, and as has been proved by the effect of the big German siege guns, the shells fired have been brought to such perfection that no armor plate can resist their destructive effects.

The 4.7 siege guns of the United States army, called the 60-pounder, hurls a shell of sixty pounds weight a distance of 7,500 yards (over four miles) with great effect. The charge is 5.94 pounds of smokeless powder. The British 6-inch howitzer fires a shell weighing 122 pounds and has an effective range of 7,000 yards. From the commencement of the War of the Nations in 1914 it has been apparent that heavy siege artillery must undergo great improvements to compete with the huge guns just completed, to the surprise of the world, by the Krupps, the great German manufacturers of ordnance. Ranges of 11,000 and 12,000 yards (at least seven miles) and even more have been obtained, and shells at that range have wrought terrible havoc, a thing unheard of on land before the outbreak of the last war. Naval guns of largest caliber project shells with deadly effect from ten to eleven miles. F.ST.A.

**References:** Any book published prior to 1914 is worthless as a record of improvement in the manufacture of ammunition. The War of the Nations changed every standard of warfare.

The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Ammunition | Projectile |
| Navy | Shrapnel |

**SHELLEY,** *shel'i,* PERCY BYSSHE (1792-1822), an English poet of the Romantic Age of English literature. He was born at Field Place, near Horsham, Sussex, of a family recently raised to a baronetcy. In his school life from his earliest years he displayed a hatred of oppression of all kinds which clearly indicated the tendencies most noticeable in his later life. In 1810 he entered Oxford, where he soon gave evidence of his literary gifts, but his publication of a pamphlet on *The Necessity of Atheism* caused his expulsion from the university. This event was a keen disappointment to his family, and led to the cutting off of his allowance. For a time, then, Shelley lived in London, supported by what his sisters could save from their allowances, but at length his father relented so far as to give him $1,000 a year.

**His Two Marriages.** Shelley's elopement with Harriet Westbrook, a pretty school friend of his sisters and a daughter of a former tavern keeper, again turned his family against him, and he was forced to make his own way. After two years spent in traveling through England and Ireland, he became estranged from his wife, and soon afterward visited the continent with Mary Godwin. Two years later his wife committed suicide by drowning, and Shelley, whether from remorse or from grief alone, suffered keenly. He married Mary Godwin, however, and with her and their children went to Italy. Of the children of his first marriage he had been deprived because of his atheism. In Italy Shelley was associated with Byron and with Leigh Hunt, and there he produced some of his best work. In June, 1822, he went with a friend for a sail on the Mediterranean, but the boat was overtaken by a storm and both Shelley and his companion were drowned. The bodies were recovered and cremated, and the ashes were buried in the Protestant cemetery at Rome.

SHELLEY

He was one of the most ardent, independent and reckless English poets inspired by the French Revolution; a man who could face infamy and defy the conventionalities of the world. Shelley failed to adjust himself to the customs and laws of his actual surroundings. He was calumniated and despised by the public at large, and almost idolized by his intimate friends. —HALLECK.

**His Ideals.** From his early youth Shelley had to endure persecution because of his extremely revolutionary tendencies and his independence of spirit. He longed to establish an ideal state of society, based upon the principle of universal brotherhood and having as its object the development of individuality rather than the upholding of institutions. Naturally, he lived in continual rebellion against existing conditions—was what Matthew Arnold called "a beautiful and ineffectual angel, beating in the void his luminous wings in vain."

In *Queen Mab, The Revolt of Islam* and *Prometheus Unbound,* his theme is the complete liberation of the world. His views, however, were not clearly defined, nor had he any idea of practicable methods. The poems which most completely set forth his ideals and aspirations seem to the average reader enveloped in mystery. Most obscure of all his poems are *The Witch of Atlas* and *Epipsychidion.* There

is a quality of his verse, however, which all can appreciate—its music and its delicate, ethereal beauty. This is especially to be found in such lyrics as the *Ode to the West Wind, The Cloud, The Ode to a Skylark* and *Lines to an Indian Air,* and in the elegy *Adonais,* written on the death of Keats. In his poetry the most charming personifications abound, for to him nature always appeared as the symbol of his own moods and emotions. All in all, Shelley ranks as one of the first of English lyric poets; perhaps when at his best no one has ever surpassed him. A.MC C.

Consult Clutton-Brock's *Shelley, the Man and the Poet;* Angeli's *Shelley and His Friends in Italy.*

**SHEM,** the eldest son of Noah and traditional ancestor of the Semitic peoples (see SEMITES). Shem and his brother Japheth showed a respectful attitude toward their father (*Genesis* IX, 20-23), in contrast to the irreverence of Ham, and Noah accordingly prophesied that the descendants of Shem would subdue the Canaanites, or descendants of Ham, and that the Canaanites would serve both them and the descendants of Japheth. Japheth would also benefit by the achievements of the Semites. The fulfilment of this prophecy is the subject of much interesting research and discussion, some believing it to be of merely local and others of world-wide application.

**SHENANDO'AH,** PA., a borough in Schuylkill County, in the east-central part of the state, 105 miles northwest of Philadelphia. It is served by the Pennsylvania, the Lehigh Valley and the Philadelphia & Reading railroads and by electric interurban lines. Within the city and in the immediate neighborhood are a number of rich anthracite coal mines. The mining and shipping of coal is the leading industry, and there are in the place machine shops, foundries and mining-tool works. Shenandoah was settled in 1850 and was incorporated as a borough in 1866. It has good schools and churches and a public library. In 1910 the population was 25,774; it had increased to 29,201 (Federal estimate) in 1916. The area is one and one-half square miles.

**SHENANDOAH RIVER,** a river of Virginia which flows in a northeasterly direction for 170 miles through a beautiful valley formed by the Blue Ridge and the central Appalachian mountains. At Harper's Ferry it unites with the Potomac. The river furnishes a great amount of water power, but is navigable only by small steamers for about 100 miles. The Shenandoah Valley was an important battle field during the War of Secession. "Stonewall" Jackson's 1862 campaign there won him fame, and Sheridan made his historic ride of twenty miles from Cedar Creek to Winchester in the valley, reorganizing his troops and returning to defeat Early. See SHERIDAN, PHILIP HENRY.

**SHEP'ARD,** HELEN GOULD, eldest daughter of Jay Gould. See GOULD (family).

**SHEPHERD,** *shep'erd,* **DOG,** the general name of a group of dogs used to guard flocks of sheep. They are usually large and strong, but the group includes also the small Spitz, or Pomeranian. Of all the shepherd dogs the finest breed is the Scotch collie, described in these volumes under the heading COLLIE.

**SHER'ATON,** THOMAS. See FURNITURE, subhead *English Development.*

**SHERBROOKE,** *shur'brook,* a city in Quebec, the county town of Sherbrooke County, and one of the leading manufacturing centers of the province. It is in the southern part of Quebec, about forty miles north of the Vermont boundary, at the junction of the Magog and Saint Francis rivers, and on the Grand Trunk, Canadian Pacific, Boston & Maine and Quebec Central railways. It is 101 miles by rail southeast of Montreal, 122 miles south of Quebec and 196 miles northwest of Portland, Me. Population in 1911, 16,405; in 1916, estimated, 20,000.

Sherbrooke derives abundant water power from the two streams at whose junction it is situated. Among its manufactures are mining and other machinery; woolen, silk and cotton goods of all kinds, including carpets and clothing; cigars, and, during the War of the Nations, shells. Sherbrooke has two public hospitals, a public library, a fine post office, and a courthouse which cost $60,000 to build. The water works and the gas and electric light systems are owned and operated by the city.

Sherbrooke was named for Sir John Sherbrooke (1764-1830), a British general who fought under Wellington in Spain and in 1811 was appointed lieutenant-governor of Nova Scotia. From 1816 to 1818 he was Governor-General of British North America.

**SHER'IDAN,** PHILIP HENRY (1831-1888), a Union officer in the War of Secession, distinguished for his high courage and brilliant qualities of leadership. His military career was practically an unbroken series of victories, and he was one of the three Union officers in that war who attained the rank of general, the others being Grant and Sherman. Sheridan was born

in Albany, N. Y. He was graduated at West Point in 1853, and before the outbreak of the war between the states learned something of actual fighting in wars with the Indians. A lieutenant at the outbreak of the war, he won rapid promotion, attaining the rank of brigadier-general of volunteers in July, 1862, and of major-general the following December. Meantime he had given an excellent account of himself at Booneville, Perryville and Murfreesboro. In 1863 his division fought so gallantly at the Battle of Chattanooga that Grant, who was seeking an "active and energetic man, full of spirit and vigor and life," made him commander of the cavalry of the Army of the Potomac.

GENERAL PHILIP SHERIDAN

Sheridan took up his new command in April, 1864, and rendered valuable service throughout the summer by protecting the flanks of Grant's army and harassing his opponents. His best opportunity for brilliant service came in August, however, when he was given charge of the Army of the Shenandoah. His defeats of Early at Opequon Creek, Fisher's Hill and Cedar Creek, in the Shenandoah Valley, and his ruthless devastation of that fertile region must be counted among the blows against the Confederacy that hastened its fall. When the Battle of Cedar Creek was begun Sheridan was at Winchester, twenty miles away. Hearing the sounds of fighting, he galloped toward the scene of battle and turned defeat into brilliant victory. This now famous ride is the theme of a well-known poem by Thomas Buchanan Read, which contains these lines:

With foam and with dust the black charger was gray,
By the flash of his eye, and his nostril's play
He seemed to the whole great army to say,
"I have brought you Sheridan all the way
From Winchester, down to save the day!"

These exploits in the Shenandoah brought Sheridan the rank of major-general in the regular army, in November, 1864. During the remainder of the war he was one of Grant's most efficient aids, and was present when Lee surrendered at Appomattox.

After the war Sheridan commanded in turn the Department of the Gulf, the Fifth Military District in Louisiana and Texas and the Department of the Missouri. When Sherman succeeded Grant as general, in 1869, Sheridan became lieutenant-general, and on Sherman's retirement in 1884 Sheridan was appointed commanding general of the United States army. In 1870 he went to Europe to study operations in the Franco-German War. His *Personal Memoirs* were published in 1888. B.M.W.

**SHERIDAN,** Richard Brinsley Butler (1751-1816), a British dramatist whose fame rests chiefly on two comedies, *The Rivals* and *The School for Scandal.* Both are classics of English drama, ranking among the best comedies produced in England since the time of Shakespeare. Sheridan was born in Dublin, Ireland. Though he studied law his fondness for writing caused him to take up literature as a means of livelihood, and in 1775 *The Rivals* was successfully produced in London. In the same year his comic opera *The Duenna* was staged. This played for seventy-five nights, a sensational "run" in those days. Sheridan soon after purchased the Drury Lane Theater and managed it until 1809, when it was burned. This disaster cut off the greater part of his income, and during the rest of his life he was in serious financial difficulties. At one time his friends had to raise money to obtain his release from a debtor's prison.

Sheridan was very popular among the literary men of his time, because of his wit and charming personality, and he belonged to Dr. Johnson's famous Literary Club. Besides the comedies mentioned, his principal works are a farce called *Saint Patrick's Day* and a comedy entitled *The Critic.* He also won a name as an orator during a Parliamentary career of twelve years, especially for his speeches against Warren Hastings.

Consult Bettany's *Sheridan and His Circle.*

**SHERIDAN,** Wyo., the county seat of Sheridan County and an important live stock center, is centrally located in the state near the northern boundary, and on the Chicago, Burlington & Quincy Railroad. Prominent buildings are the state hospital, city hall, courthouse and Carnegie Library. Sheridan is the shipping point for an extensive agricultural and stock-growing country, in which there is also some coal mining. Fish and game are abundant in this section of the state. Sheridan was settled in 1882, and was incorporated the fol-

lowing year. Several memorable battles were fought in this locality at the time of General Sheridan's campaign against the Sioux confederacy in 1876. The population in 1910 was 8,408; it was 12,713 (Federal estimate) in 1916. The area is more than two square miles.

**SHERIFF,** *sher'if,* in the United States and Canada a county officer empowered to execute civil and criminal process throughout the county. Specifically, he is charged with the safe keeping of prisoners and juries, and with the prevention of breaches of the peace. He attends courts as chief administrative officer and executes their judgments. When a warrant of attachment is issued it is his duty to seize the property attached. If judgment is rendered against a debtor the sheriff is the officer empowered to seize his property and to sell it to satisfy claims of creditors. He may perform these duties in person or through an authorized deputy sheriff.

In the United States the sheriff must be twenty-one years of age, be a citizen of the country, and reside in the county which he represents. In most states the office is elective, and in some he may serve but two successive terms. The name is derived from the Anglo-Saxon word for *shire reeve,* the shire being a political division in old England corresponding to a modern county. The headman of the shire was called *reeve.*

**In Canada.** Every county or judicial district in a province is represented by a sheriff, who is appointed by the provincial lieutenant-governor in council. The sheriffs in Canadian provinces carry out the orders, sentences and judgments of superior courts. They summon juries, and have charge of jails and their keepers. Each sheriff appoints his own deputies and is responsible for their behavior as officials, and he must give security for the performance of his own duties.

**SHERMAN,** James Schoolcraft (1855-1912), an American Congressman and Vice-President, born at Utica, N. Y. He was graduated at Hamilton College in 1878, was admitted to the bar in 1880, and began practice in his native city. Not long after he became prominent in Republican politics. In 1884 he was elected mayor of Utica, and in 1887 he became a member of Congress, serving until 1909, excepting for the term of 1891-1893. He was elected Vice-President on the Republican ticket in 1908, and was renominated with Mr. Taft in 1912, but he died six days after the election in November. His place on the ticket, as voted by the Electoral College the next January, was filled by Nicholas Murray Butler, president of Columbia University.

**SHERMAN,** John (1823-1900), an American statesman, the author of the famous silver and antitrust laws that bear his name. He was a brother of the Union general, William T. Sherman, who was a Federal leader in the War of Secession, and was born at Lancaster, Ohio. During the war John Sherman was as active in the financial affairs of the nation as his distinguished brother was in the military affairs. He entered the Senate as a Republican (from Ohio) in 1861, became chairman of the Finance Committee, and was a leading advocate of the bill which established the national banking system (see Banks and Banking, subhead *Banking in the United States*). In 1875, while still Senator, he secured the passage of the Resumption Act, which provided for the redemption of outstanding United States notes (see Specie Payments, Resumption of). In 1877 President Hayes made Sherman Secretary of the Treasury, and the duties of this office he performed with high distinction. At the close of the Presidential term Ohio again sent him to the Senate, where he remained until 1897. It was during this period that he secured the enactment of the Antitrust Law (see Trusts) and the Sherman Silver Act. President McKinley appointed him Secretary of State in 1897, but the outbreak of the war with Spain, in 1898, put too great a strain upon his failing powers, and he retired to private life.

JOHN SHERMAN
Probably the most influential statesman of his day.

Consult Bronson's *Life and Public Services of John Sherman.*

**SHERMAN,** Roger (1721-1793), an American statesman of the early national period who had a prominent part in the drafting of the Declaration of Independence and of the Articles of Confederation, and in the ratification of the Federal Constitution. He was a native of Newton, Mass., but during his public career was a citizen of Connecticut. Before the Revolutionary War broke out he had served as a member of the Connecticut legislature, as justice of the peace, judge of the court of common pleas, treasurer of Yale College, judge of

the superior court of Connecticut and as a member of the Connecticut senate, and he was on the committees that framed the Declaration and the Articles of Confederation. In 1784 he was elected mayor of New Haven. When the first United States Congress met Sherman had a seat in the House of Representatives, but in the same year he was elected to the Senate (1791), where he represented his state until his death.

ROGER SHERMAN

**SHERMAN,** William Tecumseh (1820-1891), one of the greatest Union generals of the War of Secession, whose name is associated particularly with the famous march "from Atlanta to the sea." He was a brother of the statesman John Sherman, and was born at Lancaster, Ohio, on February 8, 1820. Left fatherless in his boyhood, he was adopted and brought up by Thomas Ewing, the first Secretary of the Interior. Sherman was graduated from West Point in 1840, near the head of the class, and entered the service with the rank of second-lieutenant of artillery. For the next few years he was stationed in the South, where he had his first experience in warfare against the Seminole Indians. In his leisure moments he studied law. During the war with Mexico he served in California as assistant adjutant-general, and in 1853 retired to civilian life and became a banker in San Francisco. Here he remained until 1857. In the interval between 1857 and the outbreak of the War of Secession he practiced law in Leavenworth, Kan., and acted as superintendent of a military academy in Louisiana.

GENERAL W. T. SHERMAN
One of the commanding figures of the War of Secession.

Sherman rejoined the army in May, 1861, and was shortly afterwards raised to the rank of brigadier-general of volunteers. In October he was placed in charge of the Department of Kentucky, but was relieved of the command by Buell in November because he reported that the campaign in the West needed an army of 200,000 men. Sherman's judgment in the matter proved to be correct. In April, 1862, he was able to give Grant substantial assistance at the Battle of Shiloh and was raised to the rank of major-general of volunteers. He continued to coöperate with Grant, and following the capture of Vicksburg was made brigadier-general in the regular army. After further valuable service in Tennessee and Mississippi, he was assigned to the chief command of the Military Division of the Mississippi.

In the spring of 1864 Sherman began his famous invasion of Georgia, with an army of 100,000 men. Atlanta was taken on September 1. Then followed the march to the sea, which ended on December 21 with the capture of Savannah. Early in 1865 he started northward, worked his way through South and North Carolina, and on April 18 received the surrender of Joseph E. Johnston's army, at Durham's Station. Lee, meanwhile, had surrendered to Grant, and the war was at an end.

Sherman remained on the active army list until 1884. In August, 1864, he had been appointed major-general in the regular army, and when, in July, 1866, Grant was made general, Congress conferred on Sherman the rank of lieutenant-general. On Grant's ascendancy to the Presidency, in 1869, Sherman became commanding general of the United States army, and he held this rank for fourteen years, when he was retired at his own request. In 1875 he published his *Memoirs,* in two volumes. B.M.W.

Consult Bradford's *Union Portraits.*

**SHERMAN,** Tex., the county seat of Grayson County, is a thriving manufacturing city and shipping center in the northeastern part of the state, fifteen miles south of the Oklahoma state line. It is ten miles south of Denison and sixty-four miles north and east of Dallas, and is connected with both cities by interurban lines. The railroads intersecting here are the Frisco Lines, the Houston & Texas Central, the Missouri, Kansas & Texas, the Saint Louis Southwestern, the Texas & Pacific and the Missouri, Oklahoma & Gulf. The population, which in 1910 was 12,412, was 13,667 (Federal estimate) in 1916. The area is more than four square miles.

The educational institutions of the city include Austin College (Presbyterian), North Texas Female College (Methodist), Carr-Carlton Col-

lege (Christian), Kidd-Key Conservatory of Music and Saint Joseph's Academy. Two hospitals conduct nurses' training schools. Sherman has a Federal building completed in 1907 at a cost of $145,000, a Carnegie Library, a Y. M. C. A. building, Saint Vincent's Sanitarium, and Birge and Fielder parks. Among the city's manufacturing plants flour mills are of first importance, with an annual production of between $3,000,000 and $4,000,000. Cottonseed-oil products, including cooking compounds and soap, manufactured here, find a large home market and are shipped to Mexico and South and Central America. Washing compounds, patent medicines, duck cloth, overalls and candies are also manufactured. Cotton growing and stock raising are the chief interests of the surrounding agricultural region. Sherman adopted the commission form of government in 1915.

SHIELDS OF ANCIENT AND MEDIEVAL DAYS

(*a*) Greek; (*b*) Roman; (*c*) shield of William the Conqueror (about 1066); (*d*) shield of the English Crusader in the Third Crusade (1189-1191); (*e*) method of holding the shield.

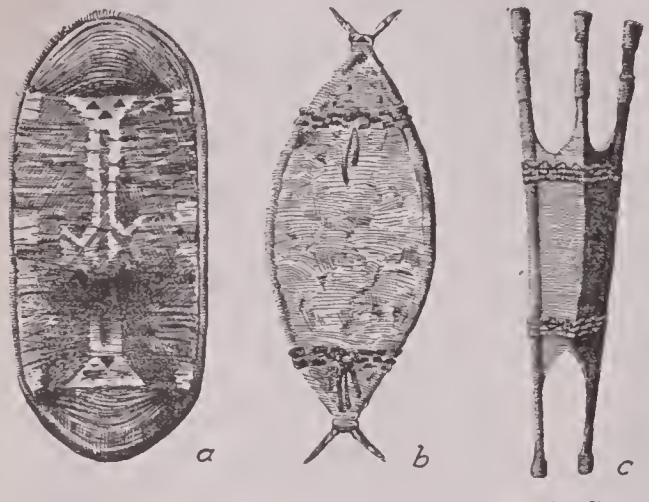
**SHERRY,** *sher'i,* a dry wine containing about fourteen per cent of alcohol, named from the town of Jerez, in Spain, around which lie the choicest vineyards of the kingdom. The finest grades of sherry are *amontillado* and *manzanilla.* Genuine sherry is white in color and has a delicate flavor. Several commercial varieties are found on the market. These are darkened by being mixed with brandy and other spirits, and are often amber colored. A light, white wine in imitation of Spanish sherry is made in California.

**SHET'LAND ISLANDS,** the most northerly possession of Great Britain in Europe, an island group lying between the Atlantic Ocean and the North Sea. They are about fifty miles northeast of the Orkney Islands, which lie off the north coast of Scotland, and are 210 miles west of Norway. The Shetlands constitute a county of Scotland. From these islands come the famous Shetland ponies, and they are also the home of a small breed of cattle and a breed of sheep noted for their long, fine wool. The islands number about 100, but less than thirty of them are inhabited, and in some cases the population is limited to the lighthouse inmates and a few shepherds. The total area is 352,319 acres, or about 556 square miles, and the population (1911 census) is 27,911. Mainland, the largest of the group, contains the county seat, Lerwick. These islands possess wild and picturesque scenery, and their rugged coasts are deeply indented. The people are engaged chiefly in fishing for herring, ling and cod, but many of them raise cattle, sheep and ponies, and the cultivation of oats, barley and vegetables is also carried on. Hosiery and shawls are the principal articles of manufacture. On the Shetlands have been found many interesting relics of the Stone Age (which see).

**SHIELD,** *sheeld,* a word of unknown origin, describing a piece of defensive armor borne on the left arm or carried in the left hand to ward off missiles and blows of a sword. In various forms and sizes it was the principal defense in battle from the most ancient days down to the time of the introduction of firearms. At the present time savage nations still carry shields to war. In the early Middle Ages the shield was the most important part of the equipment of both horse and foot soldiers. If held at arm's length it was called a *buckler;* if swung over the arm with the arm across the body it was termed a *target.*

Vikings of old, when setting out in their ships, hung their shields over the sides of the boat. In the twelfth century it was customary

to carry dead knights from the battle field on their shields. The shield of the ancient Greek infantry covered almost the entire body; the shield of the Romans was much lighter and smaller. It became customary in the Middle Ages to decorate the shield with many kinds of devices, the cross in various forms being much used. The device on the shield served




SHIELDS OF PRESENT-DAY SAVAGES
(*a-b*) African war shields; (*c*) a war shield from the Philippine Islands.

to identify friend and foe, which was difficult when men fought completely incased in armor.

The shields of savage races are usually made of oxhide and are hardened to such an extent that they easily resist the penetration of spears and darts. The shield has vanished from the battle field except where it is used as a protection to machine guns, and its use even for that purpose has been to a great extent discontinued.

**SHIITES,** *she'ites,* the lesser of the two great divisions of the Mohammedans, who reckon Mohammed's cousin Ali as the first true caliph and believe that special revelations were made to Fatima, Ali's wife. They are most numerous in Persia and India. Their worship is a corrupt form of Islam, their zeal being rather displayed in hatred of their rival sect, the Sunnites, than in obedience to the *Koran.*

**SHILLABER,** *shil'a ber,* BENJAMIN PENHALLOW (1814-1890), an American humorist whose articles, written under the pen name of MRS. PARTINGTON, gained wide popularity. He was born at Portsmouth, N. H., received a common school education and at an early age entered the printers' trade. Later, in Boston, he held several editorial positions with the *Post, Saturday Evening Gazette* and the *Carpet Bag. Sayings of Mrs. Partington,* homely bits of wisdom published in 1847, was successful, and was soon followed by other works, including *Rhymes With Reason and Without, Mrs. Partington's Knitting Work* and *Cruises with Captain Bob.*

**SHILLING,** *shil'ing,* a silver coin in the English monetary system, equal to twelve pence. There are twenty shillings in a pound, and since the pound is approximately equal to $4.86 in Canadian and United States money, one English shilling is equivalent to 24.3 cents, or practically to the 25-cent piece. The shilling is also equivalent to 1.11 German marks and to 1.25 French francs. Shillings were used in the colonial days of America, but their value varied greatly. See *Table of Equivalent Values,* page 1763, under DENOMINATE NUMBERS.

**SHILOH,** *shi'lo,* BATTLE OF, sometimes called the Battle of PITTSBURG LANDING, a desperate engagement of the War of Secession, the outcome of which caused the Confederates to lose their hold on Western Tennessee. The battle occurred at Pittsburg Landing, in Tennessee, near a log chapel called Shiloh Church, and was fought between Union forces under General Ulysses S. Grant and Confederate troops commanded by General Albert S. Johnston. Grant's purpose was to capture Corinth, Miss., a strong Confederate railway center twenty miles to the south.

Advancing along the Tennessee River, he stopped his forces, numbering about 33,000, to await reënforcements from General Buell, who was at Nashville, Tenn. Expecting no attack, he chose his position only with regard to its convenience as a camping ground, not as a battle field. Before Buell could join him, however, about 40,000 Confederates under General Johnston marched against the Union forces and drove them back. Johnston was killed in the fight and Beauregard was placed in command. On the morning of April 7 reënforcements from Buell's army arrived, together with a force under Lew Wallace, and the Confederates, overpowered in numbers, were forced to retreat. The estimated loss on the Confederate side was 10,669; that of the Union, 13,047. A month later Corinth was captured by the Federal army.

**SHINGLES,** *shing'g'lz,* thin pieces of wood of uniform length of eighteen inches, with average widths of six to eight inches, used to cover roofs of buildings. Shingles are nearly three-eighths of an inch thick at one end, from which they taper uniformly to a thickness of less than an eighth of an inch at the opposite end. When laid on a roof they must be made to overlap, one upon another, in such a man-

ner that only five or six inches of any shingle shall be exposed to the weather. Usually shingles are nailed directly upon the boards, called roofing, which cover the rafters (see Fig. 15, page 1196), but between the two tarred paper may be laid as an added protection from the weather.

If a shingle averages 18 x 6 inches in size, and only 5 inches of it lies exposed to the weather, it is clear that one shingle will cover, or be exposed on, but 30 square inches of roof. To ascertain the number of shingles required to cover a roof—

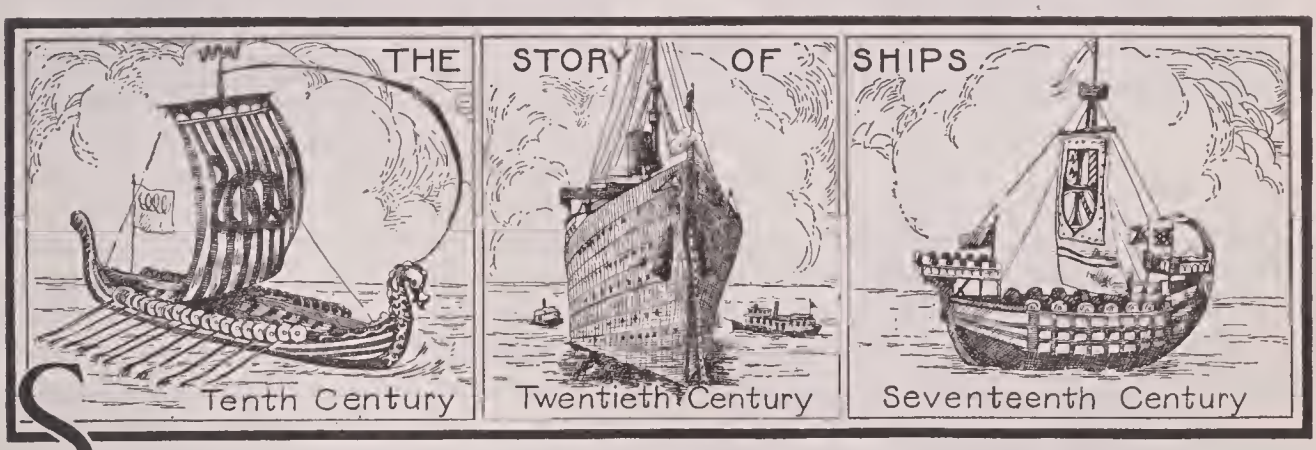
Multiply the length of one side of the roof by its breadth, in feet, then double the product, to obtain the area of both sides, in square feet. Multiply the sum of the two sides by 144, thus finding the area in square inches. Divide this product by the number of square inches of each shingle exposed to the weather; the quotient will be the number of shingles required. Divide by 200, the number of shingles in each bunch as packed for sale, to find the number of bunches required.

**Sources of Supply.** Shingles are made principally from cedar, which wood is most durable for the purpose, as it warps and shrinks but little on long exposure. The great shingle mills are located near vast cedar forests, therefore the main source of supply is in the Canadian province of British Columbia and the states of Washington, Oregon, California, Idaho and Montana. Other sections produce cedar shingles in smaller quantities, notably Michigan, Virginia, North Carolina, Maine, Wisconsin and Alabama, named in their order of importance.

**Other Roofing Materials.** While shingles are the cheapest roofing material and meet every essential demand in most communities, more expensive slates and tiles, in various colors and designs, are employed on large buildings and even on residences within prescribed limits of cities. They serve as an added protection against fire.

**SHINNEY,** *shin'i,* another name for hockey, described on page 2805.

**SHINTO,** or **SHINTOISM,** *shin'toh iz'm,* the ancient religious cult of Japan, the least developed of all the national religions, having no supreme deity and no moral code. Its central feature was sun worship, and a system of ancestor worship was also practiced. According to its traditions, the reigning emperor is descended from one of the Shinto gods. Shinto has not been able to maintain itself as a religion, but all court officials must observe its forms, as its rites have been adopted for the state religious ceremonies.

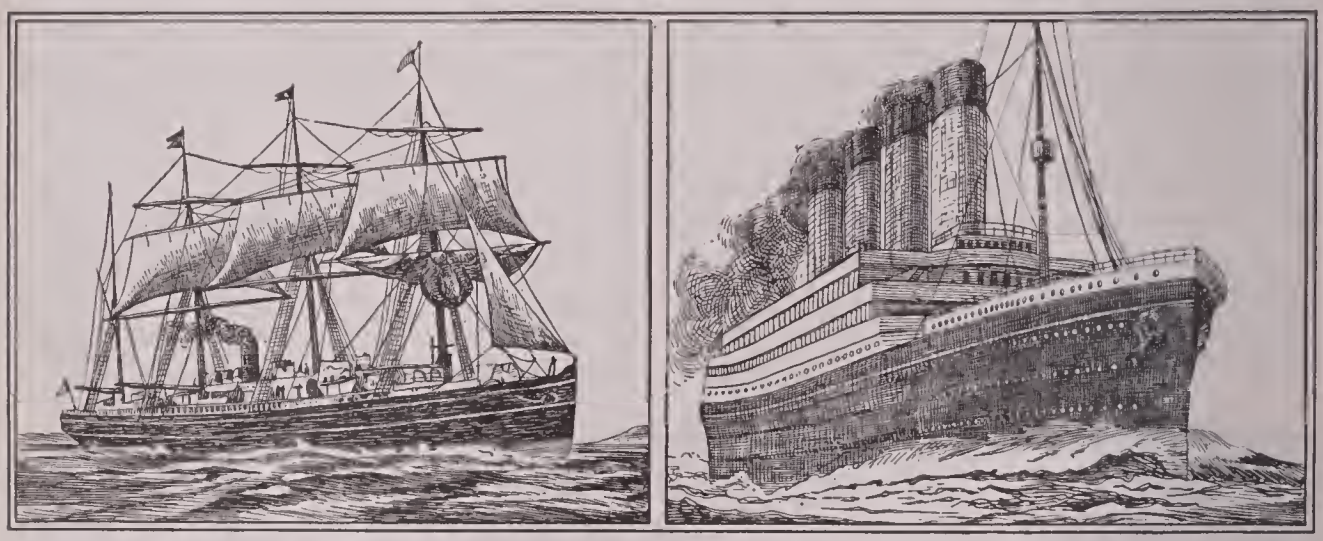



**SHIP,** a large vessel intended for ocean travel. When all ships were driven by the pressure of wind against sails, ships were those vessels which were fitted with at least three masts bearing square-rigged sails. Now, however, the term is applied to large vessels in general.

**Steamship.** Ships are of two sorts—sailing ships and ships propelled by steam. Steamships have now almost monopolized the passenger-carrying traffic of the world, and they have almost driven the slower and less dependable sailing craft from the sea. Men have built ships from the most ancient times, but the modern science of designing is hardly three-quarters of a century old. The tendency has been steadily to increase the carrying capacity, steadiness, comfort and speed of ships; and this has involved an enormous increase in their size and in the power of their engines. The highest type of transatlantic liner is as luxurious as a modern hotel, and carries, besides its cargo and crew, a floating population as numerous as that of a small American town.

The giant *Imperator,* of the Hamburg-American Line, is a good type of these floating hotels. It was launched in 1913. This ship has a total length of 909 feet, a width of ninety-eight

feet, and a depth from keel plate to topmost structure of almost 100 feet—about the height of an eight-story building. Engines of 62,000 horse power, consuming 1,000 tons of coal a day, drive it through the water at an average speed of twenty-three knots (almost twenty-six and one-half miles) an hour. Such a vessel as the *Imperator* provides accommodation for 800 first-cabin passengers, 600 second-cabin, 900 third-cabin and 1,700 steerage passengers. The crew numbers 1,200. In laying down the *Imperator* its owners decided to sacrifice a certain amount of speed in order to gain carrying power, so that its speed record does not indicate the full ingenuity of modern builders. The English-built ship *Mauretania* of the Cunard Line maintained a speed of twenty-seven knots



DEVELOPMENT IN A FEW YEARS OF SHIPBUILDING

At the left is the *Oceanic* of 1880, supplied with sails as well as with steam power, to lessen running expenses. At the right is a type of the great steamships of to-day.

for several hundred miles on its trial trip, and later kept up an average of more than twenty-six knots an hour for the transatlantic voyage. The *Mauretania* is 790 feet long and eighty-eight feet wide, and its hold is over sixty feet deep. It is driven by Parsons turbine engines of 70,000 horse power, turning four screws. The *Lusitania,* sunk by a German submarine in 1915, was a sister ship of 31,550 gross tonnage, a trifle less than that of the *Mauretania.*

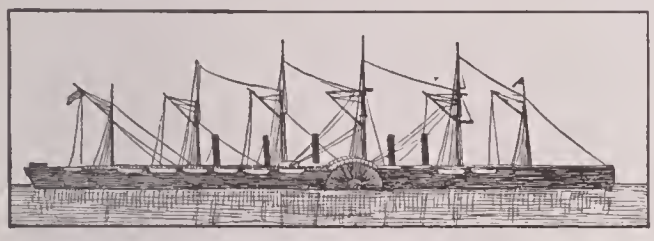
The *Titanic,* of the White Star Line, destroyed by an iceberg collision in 1912, was a ship of 43,500 tons, 850 feet long, 92.5 feet wide, with a depth of 64.5 feet. It was designed for a speed of twenty-one knots. The *Olympic,* also of the White Star Line, is a ship of substantially the same model, driven by Parsons turbines and reciprocating engines, and having three screws. Such ships as these, as perfectly appointed as the most expensive of private clubs, offering even the luxury of a marble swimming bath, have been developed by keen competition for the passenger-carrying trade between Europe and America. The rise of Germany as a maritime power greatly stimulated rivalry during the last decade, and it is worth noting that a German-built ship, the *Deutschland,* established a new record between Sandy Hook lighthouse and the coast of Ireland in 1900.

The Hamburg-American Company built the great *Vaterland,* completed in 1914, and at that time the largest steamer on the seas. It has a gross tonnage of 54,300. When the War of the Nations began this steamer was interned in New York harbor and was kept there until America joined the allies in 1917. After the break between the United States and Germany the American government took over the *Vaterland,* which had been damaged by its crew, made the necessary repairs and put the steamer afloat under the American flag.

*Construction.* The change from sail to steam and from wood to iron and steel in steamship construction progressed together. The *Savannah* was the first ship to steam across the Atlantic. It was laid down at New York as a sailing vessel, but was equipped with steam power and fitted with paddles. The *Savannah* made the crossing in 1819, covering the distance between Savannah and Liverpool in twenty-five days, arriving just as the scientists of England had decided that such a feat was impossible. Conservative builders were likewise distrustful of iron. Iron, they argued, is heavier than water; how can an iron ship be expected to float? Experience has now shown that the steel ship is lighter than the old wooden ship, more durable and stancher. In particular, the requisite strength at points subjected to ten-

sion is easier to obtain. In 1917 vessels constructed of concrete were projected.

The chief points considered by a designer are stability, capacity, strength and speed. For great speed, narrow, long lines are necessary, but they can be obtained only at a sacrifice of carrying capacity. The first consideration is, of course, safety. The stability of a ship in the water depends upon the proportion of its parts, the weight and disposition of the cargo



THE *GREAT EASTERN*

This vessel was not typical of boats of its day, for it was constructed for cable laying, and was made so long that people were sure they never would see another vessel of its size.

and the displacement. The displacement is measured by the weight of water the ship displaces, and this weight is equal to that of the ship with its cargo and passengers. Steel was introduced under modern conditions of building about 1870, and its use has tended to alter the lines of modern ships. Ships of wood had projecting keels, which increased their stability and rendered them more manageable. The great steel liners and freighters of to-day are built without external keels. The bottom of the ship is a keel plate of steel, extending the length of the vessel and joining the upright framework of the sides. The double-bottom system of building, developed first in the *Great Eastern* (1852), is now quite common. It has added greatly to the safety of sea travel.

In ships having a double bottom, the keel proper, which is about two feet deep, connects the central line of the keel plate with the inner bottom. It serves to support the transverse structure of ribs and joins the stem and sternposts, giving greater rigidity to the framework of the vessel. The ribs, which are of steel, are covered with a sheathing of steel plates of varying thickness. In battleships of the first line this sheathing of steel is often a foot thick, to resist the action of heavy shells. The decks are placed one above another and fastened to the framework of the sides. A cross section amidships has the shape of the letter U. The steel used in ships is known as mild steel; it is tough and pliable and so treated that it is less affected by heat and cold than tool steel.

The steam turbine engine, by which most large ships are driven, was invented by C. A. Parsons, of Sweden, in 1884. It maintains a speed of thousands of revolutions a minute, driving the twin or triple screws at racing speed. The screw was first used on ocean vessels in 1839, and has now displaced the old paddle wheels. The screw propeller is less affected by the rolling of a ship than are paddles, and it acts on a relatively greater volume of water in a given time.

Experiments which had been conducted during a considerable period culminated in 1888 in the use of petroleum spirit for fuel instead of coal. The naphtha launch and the high-speed racing boat were later developments. They are driven by internal combustion engines, the power being applied directly by a succession of small explosions within the engine. Large motors burning heavy oil fuels have been installed in vessels of considerable displacement, but their use is still confined chiefly to craft of smaller types. There is a tendency in present-day warship building to install oil-burning engines.

The use to which the ship is to be put determines the design. Passenger vessels ride high in the water, so as to afford ample light and air for the tiers of cabins. Cargo vessels, on the other hand, ride much lower, especially when laden. These cargo ships, sometimes called *sea*

THE *SAVANNAH*

The first steaming vessel to cross the Atlantic Ocean. The feat was accomplished in 1819.

*tramps*, do a great part of the world's carrying. They maintain an average speed of from ten to eleven knots, being built for capacity rather than for speed. The freighter of the Great Lakes is regarded as a model of adjustment to the ends it serves. Ore carriers like the *J. Pierpont Morgan* are built 600 feet long and with a 60-foot beam. They carry 12,500 tons of coal or ore, or 450,000 bushels of grain. The

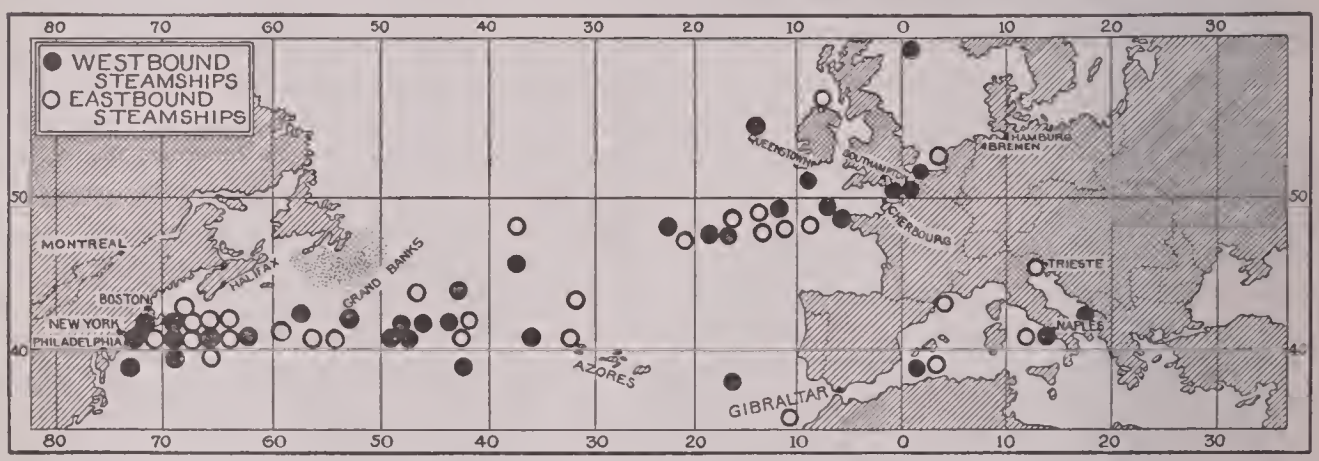
bottom is flat and the sides are almost vertical, so the cargo can be lifted with great scoops in about ten hours.

**Sailing Ships.** The sailing ship had developed many distinct types before the era of steam, the chief of which was the full-rigged ship with at least three masts supporting square sails. Vessels of the schooner type are fore-and-aft rigged, and all sailing vessels may be divided into fore-and-aft rigged and square-rigged or some combination of the two. In spite of the competition of steam, sailing ships still keep the seas, crawling to all the ends of the earth with their cargoes. These surviving "wind-jammers" cannot be compared in grace of line or speed with the smart clipper ships of former days.

Between the fifteenth century and the application of steam, the sailing ship went through a long evolution. The fifteenth century ship was clumsy and unseaworthy, but the discovery of America gave great impetus to maritime development, and the lines of sailing craft were steadily bettered. Spain took the lead, yielding later to France and Holland and finally to England. Such ships as the *Sovereign of the Seas,* the first three-decker, cost England about $1,500,000, in the seventeenth century. It was 168 feet long and forty-eight feet in the beam and mounted 100 guns. American ship carpenters were cunning workmen and were among the first to avail themselves of the investigations of Scott Russell into the principles of construction. Russell announced his principles in 1832; shortly afterwards, the Americans began to lay down the fastest ships afloat. Their famous clipper ships had sharp bows and a deep stern; they were long and low in the water, and carried slender spars with a great spread of canvas.

**Battleship.** See WARSHIP.

**History.** The earliest known builders of ships were the Egyptians, but it is believed that they derived their knowledge from neighboring peoples whose records have been lost. The Phoenicians were the greatest builders of antiquity. They were colonists and bold navigators, who developed the "long" fighting ship, propelled by three banks of oars. The Romans also used long vessels with several banks of oars, the trireme having been probably from 100 to 160 feet in length. War galleys had one or two masts with square sails bent to yards. Among the barbarian peoples of the North, the great builders were the old Norse sea rovers, who understood the art of building ships that were quite seaworthy.




A WINTER DAY ON THE ATLANTIC

This is a map such as newspapers publish to show the daily progress of ships on their way across the ocean. Each circle on such a map is given a number in daily reports so that any boat can be identified. The day of which this is a record was early in 1914, before the War of the Nations interrupted regular sailings. The map does not show the separate east and west lanes, but it illustrates the fact that in winter and spring the boats keep to the south when near the American coast, in order to avoid icebergs. The shorter summer route to England from the United States passes close to the Grand Banks. From about August 24 to January 14 westbound steamers travel 2,856 miles between the last light on the English coast and New York; eastbound boats have a course 30 miles longer. About January 15 ships begin to use the southern route, which is 2,953 miles in the westbound lane and 2,996 miles in the eastbound lane. When it is stated that only vessels that carry passengers are reported on these maps a good idea is obtained of the extent of sea travel.

**Disasters at Sea.** In spite of improved construction and the use of steel, the greatest vessels that man can build are not beyond the reach of peril. Of late years there have been several appalling wrecks, in which hundreds have lost their lives. The sinking of the *Titanic* by an iceberg in April, 1912, with a loss of over 1,500 lives, was one of the worst of recent disasters. In May, 1914, the *Empress of Ireland* sank in the Saint Lawrence River as the result of a collision, carrying over a thousand passengers to the bottom. When the *Lusitania* was torpedoed at sea in May, 1915,

1,150 persons lost their lives. In July, 1915, the lake steamer *Eastland* turned over in the Chicago River, while still tied to the wharf, and carried to their death 852 excursionists. G.B.D.

Consult Taylor's *The Speed and Power of Ships;* Biles' *The Design and Construction of Ships;* Chatterton's *Steamships and Their Story;* Howden's *Boys' Book of Steamships.*

**Related Subjects.** In connection with this article, the reader is referred to the following topics in these volumes:

| | |
|---|---|
| Anchor | Mate |
| Constitution, The | Navigation |
| Dock | Navy (with list) |
| Dockyards | Quarter-deck |
| Frigate | Sailboat and Sailing |
| Galley | Sounding |
| Gondola | Tacking |
| Lead, Sounding | Titanic |
| Life-Saving Service | Tonnage |
| Lighthouse | Warship |

**SHIRAZ,** *she rahz',* a city of Persia, capital of the province of Farsistan, famous throughout Asia for its wines. It is situated in the southwestern part of the country, 112 miles from the Persian Gulf, and is about 4,750 feet above the sea (see map, opposite page 417). A great stone wall shuts off the city from the surrounding plains, which are rich with vineyards and orchards and fragrant with rose gardens. Founded in A. D. 697, Shiraz, with its beautiful location, healthful climate and magnificent buildings, was for a time a center of culture. Destructive earthquakes, however, laid much of it in ruins, and the rebuilt portions do not compare favorably with the original structures. The city contains colleges, bazaars, beautiful mosques and other public buildings, and among its manufactures are cotton and woolen goods, silk, glass, inlaid articles and rose water. It has been the birthplace of many scholars and poets. Population, about 55,000.

**SHIRE,** *she'ray,* an African river, rising in Lake Nyassa. After a course of about 300 miles it joins the Zambezi about ninety miles from the Indian Ocean. In most parts the river is a broad, navigable stream, but it is interrupted by rapids and cataracts. The Murchison rapids, in its upper course, has a fall of 1,200 feet. The Shire was discovered by David Livingstone. The surrounding country is fast being developed into an important agricultural district.

**SHODDY,** *shod'i,* a term promiscuously applied to anything which is an imitation of something of known good quality, or that which is cheap and poor in quality. This application is, however, wrong, as the term should only be applied to goods that have been rewoven. In the process of wool manufacture there is a certain percentage of waste, a portion of the wool is "shed." The term *shed* has been changed into *shoddy,* to describe an industry of English origin, the making of fabrics from shed, or cast-off materials.

This industry has assumed important proportions in England, the United States and Canada. There is everywhere a market for cast-off clothing and rags, which are collected and sorted into grades of wool, wool and cotton, all cotton, etc. The rags are torn apart by machinery, dusted by beating and fanning and reduced practically to a state of unspun wool. The rags which contain both cotton and wool are treated with sulphuric acid, which destroys the cotton fibers but leaves the wool intact. The wool thus separated is spoken of as *extracted.* The wool thus obtained, having been once woven and then broken up again, is naturally in short pieces, and to make a good weave must be blended with some other material. For this blending wool of low quality is employed, or cotton may be used. The result is naturally inferior to that obtained from unused wool, but still produces fairly satisfactory material.

Shoddy is now made to appear so exactly like original cloth that the purchaser is practically at the mercy of the merchant, only an expert being able usually to distinguish between shoddy and new goods. In European countries shoddy is sold under its proper name, with no effort at deception, and the price is accordingly low. The shoddy industry, openly carried on as such, is of undoubted benefit, and many Europeans are enabled by it to clothe themselves in a way absolutely impossible before the introduction of this cheap material. In the United States much shoddy is sold, and the honest merchant explains its character. Shoddy clothing may wear excellently, and frequently makes an attractive looking garment. See ADULTERATION OF FOODSTUFFS AND CLOTHING.

**SHOES,** *shooz.* See BOOTS AND SHOES.

**SHOGUN,** *sho'goon,* a Japanese term for *great general,* or commander in chief. For several centuries previous to 1868 the shogun class, or shogunate, had exercised the real power in Japan, though nominally subject to the emperor. In 1192 the emperor Takahira made Yositomo, the Minamoto leader, a *Sei-i-tai-shogun,* meaning *barbarian-subduing, great general.* Successive generals held the title until it became practically hereditary in the Tokugawa family.

The revolution of 1867 restored the power of the emperor and the title of shogun was abolished the following year. Foreigners sometimes apply the title *tycoon* to the shogun. This is merely the English rendering of the Japanese *taikun,* meaning *great lord.* With the abolition of the shogun also came the abandonment of the old samurai military system.

**SHOOT'ING.** See MARKSMANSHIP.

**SHOOTING STAR.** See METEORS.

**SHORT BALLOT,** one of the recent proposals for government reform in the United States, is, as its name infers, a ballot containing but few names of candidates for office. The short ballot movement proposes that only the most important offices shall be filled by election, and that all others shall be made appointive and dependent upon a central authority, or upon the heads of the departments through which their work is done. In brief, the end sought is centralization of authority and responsibility.

The short ballot principle advocates what is almost the same as a commission form of government, under which a small number of officials are elected to fill important offices, who in turn appoint men to work under their direction in the administration and conduct of city or county affairs. Under such a system the appointment of men can be made according to fitness, entirely independent of popular favor or political influence.

It is being more and more realized that the affairs of a city or county should be conducted on strictly modern business principles, and the short ballot offers decided advantages for facilitating the appointment of men calculated to give good service to the community. With a ballot containing column after column of candidates' names, the average voter concerns himself with only a few of the most prominent. There are many others of which he knows little. With a ballot limited to five or even ten candidates the average voter would be moved to investigate the fitness of those who would manage the affairs of the public. The result of the vote would be an intelligent expression of opinion.

The short ballot might remove all county officials from the elective list except the county supervisors, or commissioners. These directly represent the people and to them could be intrusted the task of selecting the men fitted to conduct the public business. Electing an official to perform certain duties and then denying him the right to appoint the men who are to assist him in performing those duties is to handicap him from the start. In some states there is a demand that only the governor, lieutenant-governor and judges shall be elected officials, and that all other state officers shall be appointive. F.ST.A.

**Related Subjects.** The reader who is interested in this discussion of the short ballot may consult the following articles in these volumes:

| | |
|---|---|
| Australian Ballot | Election |
| Ballot | Electoral College |

**SHORTHAND WRITING,** a system of writing by symbols which so shortens labor that in recording speech the pen can keep pace with the voice. There are four standard systems in general use which are fundamentally the same; these are the Isaac Pitman, the Benn Pitman, the Graham and the Munson. A person who has learned one of the last three will experience slight difficulty in reading notes written in the other two systems; and if the few variations in the Isaac Pitman system are explained to him he can read it, also.

This is possible because of the various modern schemes of shorthand writing. Isaac Pitman was the inventor of what is declared to be a very philosophical and flexible system, and the others have appropriated his foundation principles. He was an Englishman, and in England his work has been adopted practically to the exclusion of all other systems. Isaac's brother Benn, of Cincinnati, Ohio, adopted the same system with about a dozen slight variations and offered it to the American public. Before he did so, however, Andrew J. Graham, of New York, took the Isaac Pitman system and expanded it to the point where it came to be recognized as the fullest, most complete and most flexible of all systems of shorthand writing. James E. Munson was the third American to build upon the foundation laid by the English Pitman. When the term "Pitmanic shorthand" is used, it refers to the systems, alike in principle and varying only in details, built by the four men named above. Other men of lesser note have also published what they term Pitmanic systems.

However, all shorthand is not Pitmanic. In a hurrying age someone discovered that from six to eight months is too long a time to spend in mastering the art of shorthand writing, even though results might abundantly justify it. Why could it not be possible to devise a system which, though it might lack the philosophical basis and some of the flexibility of the existing systems, could be mastered in

shorter time? The question has been answered by many authors; some of these have produced excellent systems, comparing well in working features with the older ones, but many have disappointed themselves and the public.

To meet the demand for systems easier to learn yet which should be practical, many people have labored. Some have declared that they have perfected systems that can be mastered in thirty days, or less; the statements have not been fraudulent, but the results offered have been so brief and so lacking in the possibility of expansion that the students who have mastered their details have found the doors to efficiency and to expertness closed by their very limitations.

| Name | Phonograph | Sound of | Direction written |
|---|---|---|---|
| P | | p as in pope | Downward |
| B |  | b " babe | " |
| T | | t " tight | " |
| D |  | d " dead | " |
| Chay |  | ch " church | " |
| J | | j " judge | " |
| K | | k " kick | Left to right |
| Gay |  | g " gag | " |
| Ray | | r " roar | Upward |
| Hay |  | h " high | " |
| F |  | f " fife | Downward |
| V | | v " vat | " |
| Ith | | th " path | " |
| The |  | th " thy | " |
| S | | s " saw | " |
| Z | | z " zeal | " |
| Ish |  | sh " wish | " |
| Zhe | | z " vision | " |
| L<br>Lay |  | l " lull | "<br>Upward |
| Yay | | y " yet | Downward |
| R | | r " roar | " |
| Way |  | w " wake | " |
| M | | m " maim | Left to right |
| Emp<br>Emb |  | mp " hemp<br>mb " ember | " |
| N | | n " noun | " |
| Ing |  | ng " thing | " |

PITMANIC CONSONANTS

Among the non-Pitmanic systems the one which has been most successful and is on an enduring and popular basis is the Gregg, the invention of John Robert Gregg, formerly an Englishman. When he introduced it into America he was living in Boston; later he moved to Chicago, where permanent headquarters were established. The Cross Eclectic Shorthand, another candidate for favor, was devised by J. George Cross; it met with temporary success, but was found too complicated to be widely adopted. Other systems which have bid for favor are the Dement, the Pernin, Longley's Takigraphy, the McKee and the Scovell. A list of many still less important might be printed, for it is known that no fewer than 1,070 works on shorthand writing have been printed in the English language.

Inasmuch as the school that teaches a system not the Gregg or one of the four leading Pitmanic systems is a most unusual exception, this review confines its descriptive paragraphs to these two leaders in the shorthand world.

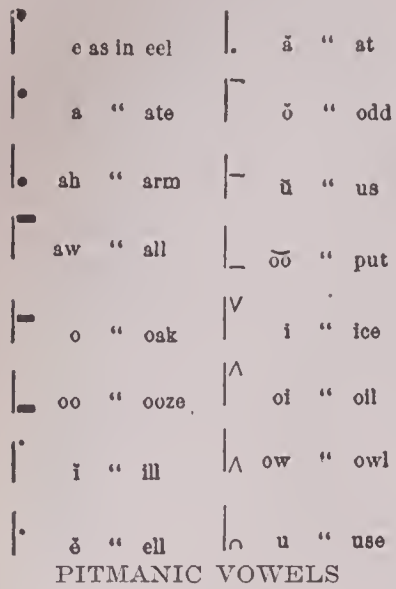
**Pitmanic Shorthand.** The Pitmanic systems derive their characters from parts of the circumference and the radii of a circle. There are only twenty-four sounds which it is found necessary to represent, but there are twenty-six characters, for *r* and *h* have two characters each, used at will. Light and heavy dots and dashes represent the vowels. When a person has learned these characters and the vowels and their positions he can write shorthand, slowly, it is true, and clumsily, for at that point he really begins to master the true art of his subject. There are hundreds of characters formed from consonant combinations which represent words; these are not always arbitrarily fixed, for in the signs and combinations are usually suggestions of the word or words which the signs represent.

Either *t* or *d* may be added to a great many words by making their consonant signs half length, as *pay, paid;* this is convenient for the past tense, but it is more often employed in forming words ending in *t* or *d*. Thus *act* is written with the half-length sign for *k*, etc. Doubling the length of a consonant stroke adds the syllable *thr*.

What are called initial and final *hooks* are ingeniously employed. The hook is essentially a half circle attached to the beginning or to the end of a consonant stroke.

A small circle at the beginning or at the end of a consonant stroke adds the sound of *s;* a circle double the size adds the sound *scs*. A short enclosed loop attached to a consonant adds *st;* a loop twice as long adds *str*. There are further modifications of the circle, hook and loop which with a single brief stroke of the pen add frequently-recurring syllables.

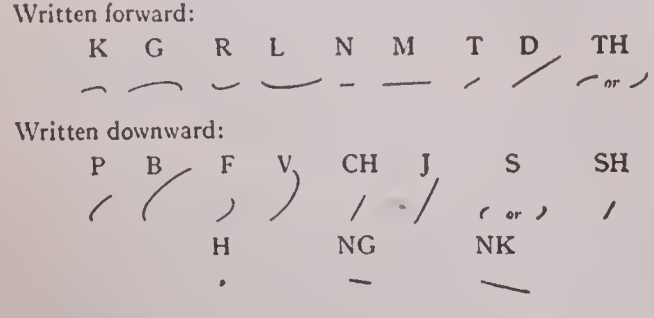
The flexibility of the system briefly described is largely due to the three positions in which all characters may be written, with respect to vowel sounds. In the first position a character is written above the line; if there be characters in combination the first one is placed above the line of writing, the others falling in their natural relative positions. In the second position characters are placed on the line; in the third, below or through the line. Another feature which provides added flexibility is that all strokes are made both light and shaded.



PITMANIC VOWELS

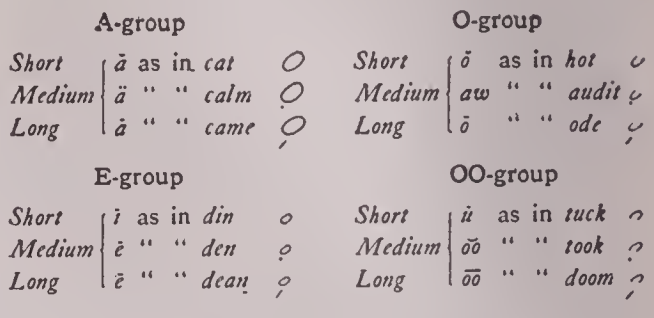
The upright lines are placed only to show locations of the vowel characters in first, second and third positions.

**Gregg Shorthand.** Of the non-Pitmanic shorthand systems the Gregg has probably met with greater success than all its competitors outside the Pitmanic group. The Gregg is a radical departure from everything that had preceded it. The claim is made that it can be learned in one-half the time a Pitmanic system requires. It is a light-line system, there being no shaded characters; two or three or five positions for writing the characters, which characterize other systems, are unknown, for all writing is on one line; vowels and consonants are joined, and follow each other in their natural order. Gregg writers are taught many contractions, but they are not obliged to learn as many word-signs as are presented in the Pitmanic systems.




It has been shown that the Pitmanic characters are based on straight lines and the parts of a circle; the Gregg characters are straight lines and parts of elliptical figures. The illustration in the preceding column gives the consonant representations.

The vowels are presented in groups, arranged conveniently by their sounds:




The following are the dipthongs used:

The promoters of the Gregg system claim that a million people have adopted it for daily use. Figures are not available for any of the Pitmanic systems, except that it is stated that ninety per cent of the court reporters of the United States employ either the Graham or the Benn Pitman phonography.

**Historical.** Shorthand was an ancient art, but was apparently almost lost to the world during more than seven centuries. In the first century B. C. Marcus Tullius Tiro, secretary to the great Cicero, invented a crude shorthand system, and called it *brief writing*. Others enlarged upon his invention, and in the fifth century the system contained 13,000 characters. In the eighth century, for reasons unknown, the art disappeared; in the year 1500 there were found notes in the old Roman brief writing of about the year 800.

The beginnings of modern shorthand date from 1588, when Timothy Bright prepared a list of several hundred words with abbreviations. It was not at all practical, but inspired others to similar efforts. The best production of the seventeenth century was by William Mason, who named his textbook *A Pen Plucked from the Eagle's Wing*. Following him were over a dozen Englishmen, who produced more or less elaborate brief-writing systems, but not any of them interested great numbers of people. Not until Isaac Pitman published his *Stenographic Sound Hand* in 1837 and his *System of Phonography* in 1840 did shorthand writing command the attention of the entire world. E.D.F.

**SHORTT,** Adam (1859- ), a Canadian economist and educator, after 1908 a member

of the Dominion Civil Service Commission. He was born at Kilworth, near London, Ont., and was graduated from Queen's University, at Kingston, in 1883. Later he pursued special studies at the universities of Glasgow and Edinburgh. He joined the staff of Queen's University in 1885, and remained until 1908, when he accepted the appointment to the Civil Service Commission. In 1911 he was created a Companion of the Order of Saint Michael and Saint George (C.M.G.). Among his published writings are *Imperial Preferential Trade; Documents Relating to the Constitutional History of Canada, 1759-1761* (jointly with A. G. Doughty) and a biography of Lord Sydenham. Together with A. G. Doughty he also edited *Canada and Its Provinces,* a twenty-four-volume reference work.

**SHOSHONEAN,** *sho sho' ne an,* **INDIANS,** a great family of North American tribes who originally occupied a vast territory between the Rocky Mountains and the Sierra Nevadas. To this group belong the Hopi, the only Shoshonean tribe that settled in permanent villages and followed the arts of weaving, pottery and agriculture. The other tribes lived a wandering life, obtaining a food supply by hunting, fishing and gathering seeds and roots. The Utes and Banaks were the most warlike of the Shoshonean Indians. The group numbered 16,842 in 1915.

**Related Subjects.** The more important Shoshonean tribes are described in detail in these volumes under the following headings. In addition to them, see INDIANS, AMERICAN.

| | |
|---|---|
| Comanche | Shoshoni |
| Hopi | Ute |

**SHOSHONI,** *sho sho' nce,* or **SNAKE,** a division of the Shoshonean group of North American Indians, who inhabited the mountainous region of Wyoming and Montana, Central and Southern Idaho, Northeastern Nevada, Eastern Oregon and a small part of Utah west of Great Salt Lake. They were frequently called Snake Indians by those who thought that their tribal sign—a waving motion of the first finger—stood for snake. The eastern bands were called *Horse,* or *Buffalo,* Indians, because they kept horses and sometimes hunted the buffalo. Those farther west were a degraded type, said to be among the lowest order of men. As the barren country was devoid of large game, these Indians depended for food, to a large extent, on fish, small animals, roots and seeds. These western bands were often called *Diggers,* and sometimes *Walkers,* because they were too poor to own horses. The eastern tribes lived in teepees, but those in the sagebrush country used brush shelters. The Shoshoni now live on reservations in Idaho, Nevada and Wyoming, and in all number about 3,000. See INDIANS, AMERICAN.

**SHOT,** a term formerly used to describe the solid projectiles fired from cannon, but not considered in that sense since the introduction of modern shell. The term *shot* is now applied only to the smaller projectiles used in sporting weapons called shotguns. Shot for sporting purposes vary considerably in size, according to the purpose for which intended. For ordinary hunting, when the game may be partridges, snipe, woodcock or other birds, one ounce or one and one-eighth ounce of small shot are loaded in each cartridge. For larger game larger shot are used. Shot of the sporting type are made by pouring the melted lead through the holes of a colander placed at a considerable height above water, the drops of lead naturally assuming globular form and solidifying when coming in contact with the water. The different shot are numbered according to size.

**SHOT,** PUTTING THE, one of the contests in a track and field meet. When the Irish had their national games in 1829 B. C., or when Douglas, in the *Lady of the Lake*—

> sent the fragment through the sky,
> A rood beyond the farthest mark,

a heavy stone was the test of strength. Now an iron ball is used; one weighing sixteen

PUTTING THE SHOT

The illustration shows the three principal positions assumed; the start of the put, just before taking the hop; landing in the center of the circle just before the final heave; the finish, with the body thrown forward before the arm shoots out.

pounds is prescribed for senior athletes and one of twelve pounds for boys.

Success in shot putting depends upon ability to get the whole force of the body behind the heave. Throwing, in which the arm does more work, is prohibited. The put is made from

within a circle seven feet in diameter, which is usually bounded at the front by a wooden cleat (see illustration). Standing at the back of this circle, the shot putter balances the shot loosely in his hand, with the weight carried between the palm and the central fingers, the hand resting on the shoulder, and the elbow close to the body. If he is right-handed he stands with the left foot ahead, then hops forward to a position in which this foot is near the cleat, immediately jumping around so that the positions of his two feet are reversed and his weight well forward on the right foot. It is this last jump which gives force to the shot, and the arm is not thrust out till after it. The shot should be sent into the air at an angle of forty-five degrees. C.H.H.

**SHOT'GUN,** a gun with a smooth bore, generally used for shooting small game. Until recently shotguns were made with one and two barrels and occasionally with three, and the two latter yet find favor, but the single-barreled magazine or "pump gun" is steadily increasing in popularity. The standard shotguns are called 10- 12- and 16-bore, the 12-bore being the most generally used. The standard of measurement for the bore of a shotgun is the weight of bullet required to fit it. If a bullet weighing one-twelfth of a pound fits the bore, it is called a 12-bore gun; if one-tenth of a pound is the weight of the bullet, the bore is 10, and so on. The most improved shotguns, which means nearly all now in use, are breech-loaders, the cartridges, or shells, being inserted at the breech. The cartridge contains an explosive charge and a load of lead pellets called shot, varying in size according to the game to be hunted. From six to a dozen cartridges can be placed in a magazine gun.

For many years after the invention of the breech-loading shotgun, first made in 1836, no such guns were made in the United States, but now there are many factories producing weapons of great beauty and efficiency. The highest quality guns have Damascened or laminated steel barrels. Damascene barrels are built up of twisted bars of steel; laminated barrels are solid rods, bored to the required size.

Shotguns vary considerably in price, some costing less than $10, while improved guns by well-known makers cost $200 or more. Shotguns which are fired by mechanism concealed in the breech are called *hammerless,* and are usually preferred to those with visible hammers which sometimes rise above and interfere with the line of sight.

The effective range of a 12-bore shotgun loaded with 1⅛ ounces of shot is usually not more than sixty or seventy-five yards, the best range for rabbits, partridges, pheasants and other small game being forty to fifty yards. In two-barreled guns the left barrel is generally "choked," that is, made slightly smaller at the muzzle than at the breech for the purpose of condensing the shot. The barrels are usually twenty-eight inches long, and the gun weighs from six to seven pounds. F.ST.A.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Firearms | Rifle |
| Marksmanship | Small Arms |

**SHOVELBOARD,** *shuv''l bohrd,* a form of the word SHUFFLEBOARD (which see).

**SHOVELER,** *shuv'el er,* a river duck having a bill widely expanded at the end and with the upper mandible overhanging the lower. Its plumage is a mixture of green, white and chestnut. Like others of its kind, it feeds in

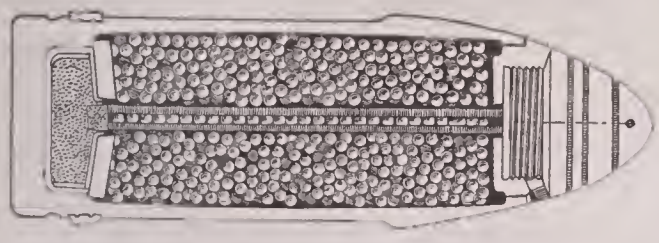
THE SHOVELER

shallow water, probing with its head immersed for mollusks, insects, roots, etc., and straining out the mud and water through "gutters" in the sides of its bill. The *common shoveler* is found in Northern Europe, Asia and America, migrating southward in winter. It nests on the ground, sometimes at a distance from water. The eggs number six to ten and are pale greenish, bluish-white or creamy buff.

Species of the shoveler are also found in South America, South Africa and in the Australian region.

**SHRAP'NEL,** a modern form of projectile used in field and naval guns. The shrapnel was invented by Lieutenant Henry Shrapnel (afterwards lieutenant-general) of the British

army in 1784, and is now recognized as the most reliable and effective of all modern shells. The shell contains a number of balls and a

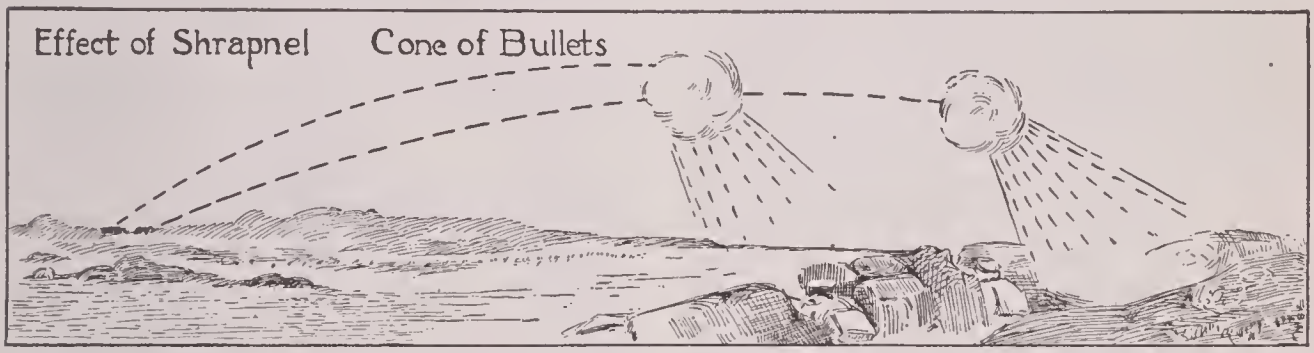


CROSS SECTION OF SHRAPNEL

The ordinary shrapnel shell is about ten and one-half inches long and nine and one-half inches in circumference, and costs the purchasing government $15. Hundreds of thousands of these shells were fired daily during the War of the Nations.

charge of powder which bursts the shell, imparting to each bullet the velocity of the shell as a whole at the moment of bursting.

**Effectiveness.** Destructive effect over as large an area as possible is sought by the use of shrapnel, which on land is used mainly for clearing covered spaces, dislodging the enemy from entrenched positions, or to destroy troops in open positions, by the shower of bullets forced out by the explosion of the shell. Fired at what is called effective range, which varies according to the caliber of the gun, the bullets from shrapnel shell sweep an area of about 250 yards by 30 yards, the forward movement of the bullets being more than eight times greater than the lateral speed. German field guns fired at 3,300 yards, the most effective range, using a Krupp shell with a steel body, strike with great effect nearer *underneath* the explosion than any other shell yet introduced. This shell is effective when used against deeply en-




THE DEADLY HAIL OF BULLETS FROM SHRAPNEL SHELLS

Behind a curtain of fire such as is shown in the illustration troops may advance upon an enemy with assurance that they will not be attacked by a hostile advance.

**Changes in Modern Shells.** With the introduction of the rifled barrels for big guns, the shell was altered, but the principle remained the same. In modern shrapnel the size of the bullets has been reduced and the number contained in the shell therefore increased; now the total effective weight of the bullets contained is equal to about fifty-three per cent of the total weight of the shell. The bursting charge may be placed at the base or at the front of the shell, and in naval shrapnel is sometimes placed in the center. The 5-inch British howitzer fires a shell of 45 pounds weight, containing 22½ pounds of bullets, the firing charge being 9 7/16 pounds of cordite, giving effective range up to 11,000 yards. The original shrapnel shells contained bullets weighing 18 to 34 to the pound, about one-quarter of the total weight of the shell being bullets. The modern field guns of 3-inch caliber fire shrapnel containing about 365 bullets, 42 bullets weighing a pound. The United States 3-inch shrapnel contains 242 bullets, each about one-half inch in diameter.

trenched positions, the bullets coming almost directly down on to the men in the trenches.

The fuse by which shrapnel is exploded may be set for time, for the instant of concussion, or may be prepared to explode when even slightly grazing an obstacle. The explosion on graze is of great advantage when firing against shielded guns.

The bullets from shrapnel shell inflict a wound of quite a different character from that caused by a modern rifle bullet, which makes a clean puncture and practically sears its own wound. The shrapnel bullet has high velocity, but it has not the steadiness of the rifle bullet, which revolves on its own axis; therefore, it is liable to make a much larger and more jagged wound than its size would necessitate if of steady flight. The shell itself also bursts into pieces of uneven size and inflicts terrible injuries.

The shrapnel mostly in use in the United States army is what is called the 3.2-inch shrapnel, with the explosive charge in front of the bullets. The total weight of the shell fired

bears a definite relation to the caliber of the gun. In naval guns the total weight of the shell is equal to the cube of the caliber divided by two. For example, when speaking of a 6-inch gun, that means the caliber of the gun. The approximate weight of the shell fired by that gun would be 6×6×6=216, divided by 2=108 pounds, total weight of the shell. The length of the shell is usually 3½ times the caliber, so that the 6-inch gun would fire a shell 108 pounds in weight and 3½ times 6, or 21, inches in length. The shrapnel shell is 3½ and sometimes 4 calibers in length, the 3-inch field guns thus firing shells of 10½ or 14 inches in length. F.ST.A.

See the articles AMMUNITION and ARTILLERY, and the note following the last-named title.

**SHREVEPORT,** *shreev'port,* LA., the county seat of Caddo Parish, and the second largest city in the state, ranking next to New Orleans. It had a population of 28,015 in 1910; this had increased to 35,230 in 1916 (Federal estimate). The area is more than nine square miles. The city is situated in the northwest corner of the state, 170 miles east of Dallas and 326 miles northwest of New Orleans. It is on the Red River, at the head of navigation, and is the junction of the Houston & Shreveport, the Kansas City Southern, the Louisiana & Arkansas, the Louisiana Railway & Navigation Company, the Missouri, Kansas & Texas, the Saint Louis Southwestern, the Texas & Pacific and the Vicksburg, Shreveport & Pacific railroads.

The city has Lakeside, Princess and Schumpert parks, a Federal building erected in 1912 at a cost of $100,000, a parish courthouse which cost $200,000, a city hall, Masonic temples, Elks' Club, Hotel Youree, and fine churches and banks. Centenary College (Methodist), the State Charity Hospital, two private hospitals and the Genevieve Orphanage are the principal institutions. A municipal market is one of the city's industrial advantages. At Shreveport is held the Louisiana State Fair.

Because of its fine trading facilities and the natural wealth of the surrounding country, Shreveport has become an important distributing center for a wide area. Caddo Parish has rich oil fields, and the yearly value of the output of the city's refineries runs into millions of dollars. Cotton is the chief crop of the adjacent country. The principal manufactures are window glass, bottles, machinery, sash, doors, blinds, safes and vaults, silos, stoves, fertilizers, cotton and peanut oil.

Shreveport was settled in 1827 and was incorporated as a city in 1834. In 1910 the commission form of government was adopted. J.E.H.

**SHREW,** *shroo,* a family of insect-eating mammals, including among the several species the smallest animals known that suckle their young. They are widely distributed in both the eastern and western hemispheres, and are

THE SHREW

found chiefly in fields, woodlands and gardens, though some live part of the time in water, and others frequent the marshes. As may be seen from the accompanying picture, shrews look very much like mice, but in habit they are more nearly related to the moles. They have long, slender snouts that can be moved at will, and tiny eyes and ears, and their bodies and tails are covered with dark, short hair. Insects and worms form the chief part of their diet, but some species feed on young birds and other small creatures of the woods.

Several larger animals prey upon the shrews, such as weasels, foxes and owls, but their strong, musky odor protects them from some of their natural enemies. The smallest shrew known is found in Italy and is but an inch and a half in length. In America there are several species, the largest, the *water* shrew, being six inches long. The *short-tailed,* or *mole,* shrew of Eastern United States is a flesh-eating species. Another American shrew, called *shrew mouse,* is found in large numbers about marshes and streams. It is much lighter in color than the mole shrew. These little creatures are harmless, and they are useful in gardens because they prey upon insects and grubs.

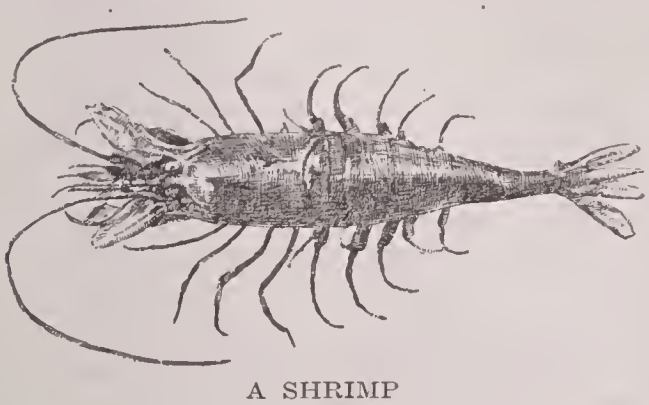
**SHRIKE,** *shryk,* two species of North American birds, known respectively as the *northern shrike,* or *butcher bird,* and the *loggerhead shrike.* The former ranges from the far north in summer to Kansas and Virginia in the win-

ter, while the latter is found principally south of this area. Shrikes are easily recognized by their strong, hooked beaks and their colors of gray, black and white. They have a habit of impaling the grasshoppers, mice and smaller birds upon which they prey on thorns, fence barbs or forked twigs, and of tearing them to pieces in this convenient position. Their nests are built of small sticks and grasses in low trees or bushes. The eggs are three to five in number, of a dull or creamy white color, thickly marked with cinnamon and lavender.

THE SHRIKE

The shrikes of the Old World include a confusing number of species, only a few of which are true shrikes. It is said that the name originated in imitation of their harsh screeches or shrieks.

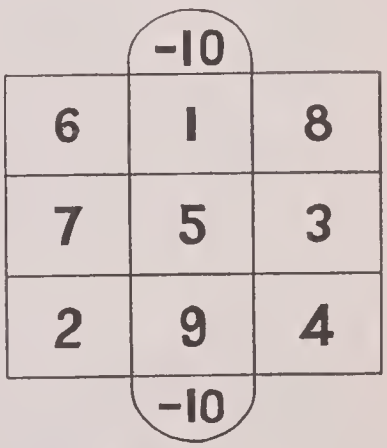
**SHRIMP,** a group of shellfish resembling the crawfish (which see) and of considerable commercial importance as a food. The common shrimp of the North Atlantic shores of Europe and America is about two inches long and is greenish-gray in color, with spots of brown. Its body is delicately constructed and is semi-transparent. The shrimp is provided with a pair of long feelers, and its front pair of feet have pincers for grasping prey. These animals frequent shallow waters where there is a sandy bottom, and when in danger they hide in the sand. They are caught in nets, and are marketed in canned form.



A SHRIMP

**SHROVE TUESDAY,** in the Roman Catholic Church, is celebrated the day before Ash Wednesday, which is the beginning of the Lenten season. It was so called from the old custom of confessing or receiving *shrift* on that day, but at the present time, in most Catholic countries and communities, it is a great festival of rejoicing, preceding the penitential season. It is the *Carnival* of the Italians, the *Mardi Gras* of the French and the *Pancake Tuesday* of the English. In the city of New Orleans it has been celebrated since 1857 by a wonderful street pageant, brilliant masque balls and other festivities. See Mardi Gras.

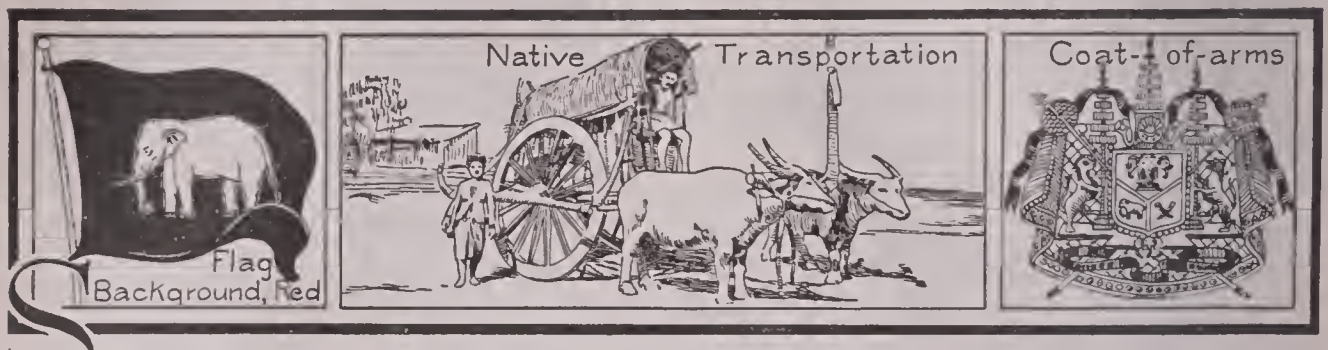
**SHUFFLEBOARD,** *shuf''l bohrd,* or **SHOVELBOARD,** *shuv''l bohrd,* a game played indoors and on decks of ocean steamers. It is played by two or four persons, each side using four circular pieces of iron, which are slid along the length of a board or on the deck, as the case may be. In the indoor game a sand-sprinkled board thirty feet long and with raised edges is used. Lines are drawn across the board five inches from each end, one being the starting and the other the finishing line. The players slide the pieces in rotation. If a piece is left projecting over the edge of the board three points are counted for the player. If it rests between the finishing line and the edge, or on the line, two points are counted. If no piece is inside the line the one nearest to it scores one. A side first making twenty-one points wins. The players change ends following every round.




SHUFFLEBOARD

The accompanying diagram shows the method of marking the deck when the game is played on shipboard. The players stand nine or ten paces away, and in rotation push the pieces (wooden weights) along the deck with a long staff having a curved end. No scores are counted until the end of a round, as the weights may be knocked out by an opponent or pushed into a better position by

a partner. If a piece rests in a semicircular place ten is taken from the score; those resting on the numbered squares give the player a score corresponding to the numbers. The game is exactly fifty points, and if the score is higher than fifty the excess is deducted from the total.




SIAM, *si'am,* popularly known as the LAND OF THE WHITE ELEPHANT, is the only independent kingdom of the Indo-Chinese peninsula. It is called by the natives *Muang Thai,* or the *Kingdom of the Free.* Except on the south, which borders the Gulf of Siam, the greater part of the country is enclosed by the English province of Burma, on the west and northwest, and the French territory of Anam, on the northeast and east. Lower Siam is a long, narrow strip of land extending down into the Malay Peninsula as far as the Federated Malay States. The total area of the kingdom, including Lower Siam, which is about equal to that of the state of Pennsylvania, is 195,000 square miles, almost four times that of the state of New York.

**The People.** In 1910 the first full statistics of the population were obtained, the total number of inhabitants being 8,149,487, about 400,000 fewer than in the state of Pennsylvania in 1916. Many Laotian peoples live in the northern part of the kingdom, and Shan, Karen and Kamoo tribes dwell in the uplands. Many more northern Asiatics, chiefly the Chinese, who are the business men of the nation, live in the cities. One-third of the population of Bangkok is Chinese. This beautiful green and gold city, called the "Venice of the East," is the capital and largest city of the kingdom, its population in 1914 being estimated at 628,675.

The typical Siamese is indolent, light-hearted, submissive and hospitable. He is of Mongolian stock, of medium height, olive complexion, fairer than the Malay but having similar flat, ugly features. There is no great distinction of caste such as exists among the neighboring Indian peoples.

**Religion.** The Siamese are very orthodox Buddhists, and their country is often called the Land of the Yellow Robe, referring to the gown worn by the Buddhist priests. All educated Siamese men at some time serve as teachers of this religion. Since India and Burma have been ruled by Great Britain, the King of Siam is recognized as the protector of the Buddhist faith. The natives observe many peculiar customs and ceremonies. Their regard for the sacred white elephant has played a prominent part in their history and government, and this accounts for the popular name of the country. The national flag bears a white elephant upon a scarlet ground. It is believed that the soul of some great king or potentate, possibly even that of Buddha himself, is embodied in the white elephant. These animals are, therefore, considered priceless. They are provided for by the king, and their possession is considered auspicious to his reign. There are countless sacred legends concerning the white elephant, among them being the story that Buddha's mother in a vision saw Buddha embodied in a white elephant; another, that one of the seven gifts to the infant Buddha was—

". . . . . a snow white elephant,
The Haste-Katna, born to bear his king."

The temples, of which there are over 7,140, noted for their beauty and rich decoration, all bear the image of the elephant.

Besides the Buddhists, there are many followers of Mohammed and Confucius, and though the number of Christian converts is comparatively few, the remarkable advance of Siam in its intercourse with other nations is due to Christian missionaries.

**Education.** Much of the education is in the hands of Buddhist priests. All of the royal monasteries, government schools, hospitals and a Pasteur Institute are in charge of the Minister of Public Instruction. In Bangkok in 1914 there were 142 elementary, two secondary and six English schools and a civil service college.

A university with eight departments is being established.

**The Country and the Climate.** Entrance into Siam is usually made through the harbor at Bangkok, the wide mouth of the Menam River. This great waterway flows through central Siam in a southwesterly direction, and to its annual overflow the fertility of its great valley is due. Almost as much as in Egypt, the welfare of millions depends upon flooding by the country's great river. The Ban-Pa Kong and the Mekong are other important streams of the rich lands of the central section. This is the region of open grass and rice lands, swamps, reed and bamboo jungles. As one journeys up the Menam River, the country grows more hilly. Covered with dense forests of teakwood, the hills rise to steep mountains in the extreme north. The Mekong, the largest of all the rivers of Indo-China, drains this northern region. Lower Siam is mountainous and wooded. The rivers are small and shallow, and the coast is ragged and studded with islands.

LOCATION MAP

The small black area in Southeastern Asia makes clear the relative sizes of Siam and the other Asiatic countries.

Although the climate is tropical and its great humidity is enervating and unhealthful for Europeans, it has not the extreme heat of India. In the dry season, lasting from October until May, after the hot, glittering sunlight of the day, cool nights descend with amazing suddenness, "for there is no twilight within the courts of the sun." During the wet season, the excessive heat is made more intolerable by the great humidity. The rainfall is heavier in some sections than in others, but averages 240 inches a year.

**Industries.** Practically the whole population of Central Siam, outside of Bangkok, is occupied in the growing of rice, of which there are forty or fifty varieties. The method of cultivation is very primitive, but effective, and Siamese unhusked rice is of the best in the world. It is the national food and the chief export. During the year 1914 the export amounted to 1,176,980 tons. Many fruits are abundant, including the mango and mangosteen. Large tracts of waste lands have been recently reclaimed by an irrigation company, and pepper, tobacco, hemp, maize, coffee and cotton are grown. Next to the production of rice, the gathering of teakwood in Northern Siam is the most important industry. It is controlled by the Forest Department, which consists chiefly of British officials. In the year 1914, the export of teakwood was 51,236 tons. Foreign trade is carried on chiefly with Great Britain, India and China.

Siam's mineral resources are varied, but with the exception of the mining of tin in Lower Siam they are not extensively developed. Gold, zinc, antimony and coal are found in some of the provinces. Gold and silver handwork, rice mill, saw mill and pottery products are the only manufactured goods of Siam.

**Transportation and Communication.** Modern means of transportation are replacing the elephant, coolie and oxcart as burden carriers. In January, 1916, there were 895 miles of railroads in Siam. In the year 1915, about 1,950 vessels entered the port of Bangkok. In 1909 a Siamese company established a line between Bangkok and Chinese ports in competition with the North German Lloyd Orient Line. In the interior the rivers are important commercial highways. Mail is delivered through 255 offices and agencies, and a parcel post service has been established. In 1915 there were sixty-seven telegraph offices, two telephone exchanges and two wireless stations.

**Government.** With the exception of China and Japan, Siam is the only independent government of Eastern Asia. Many European and American ideas have been introduced by the American, British, French and Japanese advisers of the king. The government is an absolute monarchy, and the Crown usually hereditary, the king having the right to appoint his successor. A legislative council of forty members shares the power of making laws with the king and his cabinet, composed of the ministers of the several departments. The kingdom is divided into seventeen *monthons,* or districts, ruled by high commissioners under the king. Several tributary districts are under their own chieftains. Since 1892 justice has been dispensed by organized courts with qualified judges appointed by the ruler.

**History.** Much of the early history of Siam is filled with fable. No coherent account of events previous to 1350 is obtainable. That date marks the founding of the city of Ayuthia as the capital and the accession of the first true Siamese king. The acquaintance of the Chris-

tian world with Siam dates from the early sixteenth century, when Portuguese traders established intercourse with the country. In the seventeenth century, commercial relations with the Dutch and English were established. During this period Siam was almost continually fighting neighboring tribes to maintain its independence, and in 1767 Ayuthia was taken by Burma. After some years the kingdom regained its independence and established the capital at Bangkok.

A new era of Siamese history began in 1854, when treaties were made with Great Britain and the United States which placed Siam in the van of that great movement by which the Orient abandoned its policy of seclusion and started upon a new course of progress and development. At that time Siam was opened to the trade of all nations.

The limits of the kingdom have varied at different periods in its history. In 1891 the boundary between Burma and Siam was settled by treaty with England. In 1904, in an Anglo-French agreement, this boundary was confirmed and the provinces of Luang Prabang, Maluprey and Bakak, west of the Mekong, were acknowledged to belong to France. In 1907 more territory in Eastern Siam was ceded to France, and tracts in the Laos territory and on the south coast were returned to Siam. The kingdom was reduced to its present limits in 1909, when the tributary states of Kelantan, Trengganu and Kedah, with a total area of about 15,000 square miles, were ceded to Great Britain.

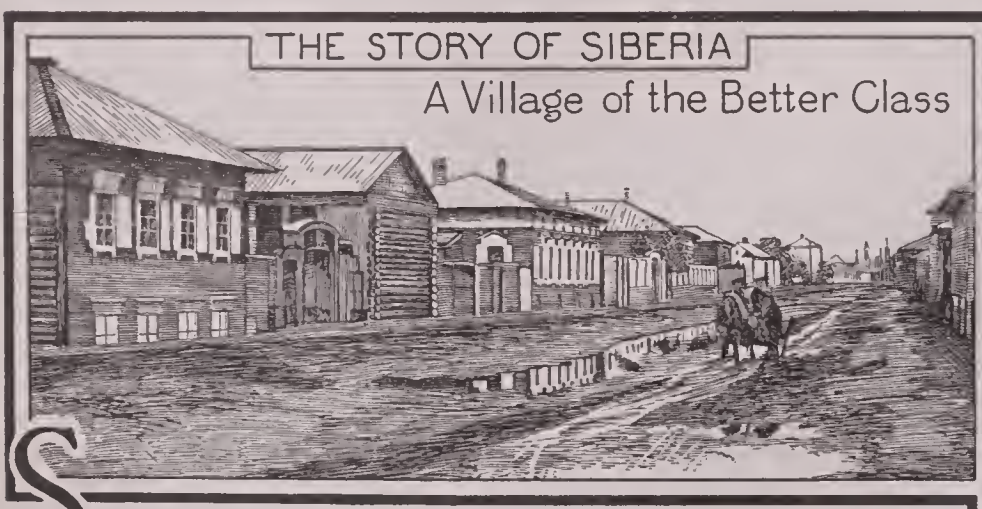
In recent years, resulting from the introduction of Western civilization, many reforms in the government have been made. Slavery was abolished in 1905, and a new penal code has been in force since 1908. The present king succeeded to the throne in December, 1911, and has been following the enlightened and liberal policy of the administrations of his father and grandfather, inviting the commerce, science and even religion of the Western world. In July, 1917, Siam issued a statement declaring that a state of war existed with Germany and Austria. The government seized nine vessels of the Germanic powers and ordered the arrest of all alien enemies in the kingdom. E.B.P.

Consult Vincent's *The Land of the White Elephant;* Whitney's *Jungle Trails and Jungle People.*

**Related Subjects.** The reader who is interested in Siam may consult the following articles in these volumes:

| | |
|---|---|
| Bangkok | Mekong River |
| Buddhism | Rice |
| Elephant | Teak |

THE STORY OF SIBERIA



A Village of the Better Class

Peasant

**SIBERIA,** *si-be'ri-a,* a Russian possession occupying all the northern part of Asia, extending from the Ural Mountains to the Pacific Ocean, and from the Arctic Ocean to Mongolia and Turkestan on the south. It has an area of a little more than 4,800,000 square miles; it is more than one and one-half times the size of the United States, exclusive of Alaska, and exceeds the area of Canada by 1,100,000 square miles. For governmental purposes Siberia is divided into four governments—Irkutsk, Tobolsk, Tomsk and Yeniseisk—and six provinces—Amur, Kamchatka, Primorskaya, Sakhalin, Transbaikalia and Yakutsk. For the government of these provinces see RUSSIA.

**The People.** Siberia has a population of over 10,000,000. The two most populous governments are Tomsk, with nearly 4,000,000 in-

habitants, and Tobolsk, with over 2,000,000. About sixty-one per cent of the people are Russians. There are about 8,000 Jews and a few Germans. The remainder of the population consists of native tribes. The northwestern section is the home of a large number of Samoyeds, a people closely related to the Finns. There is a wide difference in language and racial characteristics between the native peoples of the eastern and western parts of the country. Many Chinese are found in the region bordering on Mongolia. The exile system (see EXILE) banished to Siberia, for political reasons, many of the ablest and most highly educated men and women of Russia, and they have contributed no small share to the advancement of the Siberian colonies.

The uneducated Russians and the natives are nonprogressive, with little ambition. To the ordinary observer they seem merely to exist, exerting themselves only to procure the food, clothing and shelter for their daily needs. It is thought by some that this condition is due largely to the stupefying effect of the long, cold winters.

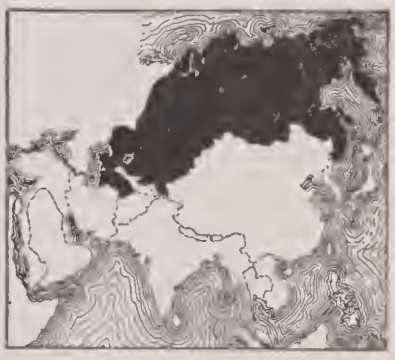
**Surface and Drainage.** The entire country is a great plain sloping gently towards the Arctic Ocean, into which all the rivers flow. The western part of Siberia is low and practically level. The Altai and Yablonoi mountains lie on the southern border, and the Stanovoi Mountains extend across the eastern end of the country to Bering Sea, with a spur extending into Kamchatka.

Amur province and the eastern part of the country are rolling and hilly, but the western part merges imperceptibly into the low tundra (treeless plains) that extends to the ocean.

*Rivers and Lakes.* Siberia is a land of great rivers. No other country except Brazil has such a large number of navigable streams, but the long winters render them almost useless for commercial purposes. From west to east the important rivers are the Ob, or Obi, whose largest tributary is the Irtish; the Yenisei, rising in Mongolia, and the Lena, known for its extensive delta. The Amur drains the extreme southeastern section into the Sea of Okhotsk.

Lake Baikal, with an area of 13,200 square miles, is the largest lake in Siberia and the largest fresh-water lake in Asia. The other lakes are unimportant. The tundra consists chiefly of marshes.

**Climate.** Siberia is known for its long, cold winters and short, hot summers. Central Siberia is considered to have the coldest climate of any region in the world, the mean temperature for January being 56° F. below zero, and the maximum cold being 90° to 93° below. Not even at the North Pole does the temperature fall so low. A dry atmosphere renders the severe temperature somewhat more tolerable than it would otherwise be. The rivers remain frozen nine months in the year. The frost penetrates to such a depth that the subsoil remains frozen throughout the year; the sudden thawing of the ground in the spring turns the country into an impassable marsh. The mean summer temperature varies from 62° to 65°, but the many hours of sunlight contribute to the rapid growth of vegetation. Excepting along the Pacific coast the rainfall is light, but the constant thawing of the subsoil supplies vegetation with moisture.



LOCATION MAP

Siberia, the area in black, is by far the largest political division of the Asiatic continent.

**Plants and Animals.** The northern sections of the tundra are covered with mosses and lichens, among which are a few scattering shrubs. On the southern border of the tundra the trees characteristic of sub-Arctic forests—the silver fir, the larch and the birch—are found. This sub-Arctic belt merges into the great forest of spruce, pine and hardwood trees that extends from the Ural Mountains to the Pacific coast, being interrupted only by rivers, marshes and peat bogs.

*Animals.* Siberia is the chief fur-producing country of the world, although some of the most valuable fur-bearing animals have been nearly exterminated by hunters. More than 1,000,000 squirrel skins are taken from the country every year. Other animals whose furs are a source of wealth are the fox, the otter, the sable, the polar hare, the wolf, the bear and the ermine. The tiger is occasionally found in the southeast, and burrowing animals abound throughout the southern part of the country. The reindeer is native in the north, where it feeds upon the mosses and lichens of the tundra. It is indispensable to the inhabitants of these inhospitable regions. The lakes and streams abound in fish.

**Minerals and Mining.** Siberia is rich in minerals, but owing to meager transportation

facilities and antiquated methods the mineral industry has made but little progress. About two-thirds of the gold produced in Russia comes from the mines in Eastern Siberia. Silver is also mined in the same locality, and the annual output of both metals amounts to about $21,000,000. The opening of the Trans-Siberian Railway created a demand for coal, and about 1,800,000 tons are mined annually. There are valuable deposits of copper, iron, lead, graphite and other minerals awaiting development.

**Agriculture.** The agricultural region includes the southern part of the country, and in the west extends northward to the 55th and 60th parallels. The black-earth region of Southeastern Russia extends into the southwestern part of Siberia, where it is devoted almost exclusively to the raising of wheat. The western part of the country constitutes the chief agricultural region, and nine-tenths of the inhabitants are engaged in tilling the soil. Wheat, oats, rye and barley are the principal crops. Of these the wheat crop is the most important. Vegetables and fruits common to a cool temperate climate are grown in sufficient quantities to supply the local demand. In many localities raising live stock and dairying are fast becoming prominent sources of revenue to the farmers.

Nearly all the land is held by the government and rented to the peasants, who live in communes, or small administrative districts. American machinery, implements and methods, however, have been introduced, and are rapidly displacing the old method of tillage and harvesting.

**Manufactures.** Tomsk is the chief manufacturing center, and has a number of large factories and mills. Flour, sugar, ironware, carpets and porcelain are its most important manufactures. The making of clothing, furniture and household utensils is carried on in the homes, or in small shops, although the opening of the Trans-Siberian Railway lessened these industries to some extent, because it provided a means for the importation of manufactured goods from Russia. On the other hand, the railway stimulated manufactures in the larger towns, because of increased facilities for transporting machinery and raw material. Manufactures are increasing all along the line of the railway and in the eastern provinces. The chief hindrances are lack of fuel and scarcity of skilled workmen.

**Transportation and Commerce.** Siberia has over 30,000 miles of navigable rivers, but they are icebound nine months of the year. Nevertheless, some of them are important waterways during the time they are open to navigation. The Ob and its tributaries, which furnish 9,000 miles of navigable streams in the most fertile district of the country, constitute the most important inland waterway. The Yenisei is navigable for 1,850 miles and is the connecting link between Lake Baikal and the trade centers on the Ob, to which it is joined by a canal. Tiumen is the most important of these centers, since at this point connection is made with the railway for Petrograd and Moscow. The Lena serves a local trade, and the Amur and its tributaries furnish over 8,000 miles of waterways to the southeastern part of the country.

COMPARATIVE AREAS

Siberia is more than one and a half times the size of the United States.

The Trans-Siberian Railway connects Vladivostok with Moscow and Petrograd, and is the most important commercial route of the country. A branch extends southward to Port Arthur, Tientsin and other important cities in China. The opening of this railway was a great incentive to the agricultural and manufacturing interests of the country. To it flows the traffic of all the great rivers, and numerous commercial and industrial centers have been developed along the line. Caravan routes, over which goods are transported on the backs of camels and horses, lead from the principal Siberian cities to the leading cities of Manchuria and Mongolia. Irkutsk is an important trade center because it is the meeting point of several of these routes and the Trans-Siberian Railway.

The foreign commerce is carried on chiefly with European Russia, China and the United States. The annual trade with the United States amounts to about $50,000,000, most of which passes through Vladivostok.

**Education.** Education is backward, and there are but few elementary schools in proportion

to the population. In 1916 fewer than 400,000 pupils were enroled in all the educational institutions in the country. The university at Tomsk has about 1,400 students, and since 1912 the Tomsk House of Science, or People's University, has been open, with free instruction. The opening of this institution marked an important step in the progress of education.

**Government.** Since Siberia is a dependency of Russia, it is under the same system of government as that country.

**History.** Siberia became a Russian possession in 1581-1582, when a band of Cossacks took the town of Sibir (Isker), on the Irtish River. In 1618 Yeniseisk was founded, and became an important center of trade between Siberia and Europe. By the end of the seventeenth century the entire country, excepting the territory of Amur, had become a Russian possession, and this was acquired from China in 1858. The opening of the Trans-Siberian Railway led to more rapid development of the country, and its importance was emphasized by the Russo-Japanese War in 1905, and again in 1914, when the War of the Nations began. When Russia deposed the czar in 1917 thousands of Siberian exiles returned to the homeland and took a prominent part in the reorganization of the government. As was inevitable, in many parts of Siberia lawless rioting followed the sudden gift of freedom, for which, after centuries of despotism, the people were unprepared. W.F.R.

Consult Fraser's *The Real Siberia;* Wright and Digby's *Through Siberia.*

**Related Subjects.** The following articles in these volumes will be of interest in connection with the study of Siberia:

CITIES

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| Irkutsk | Tobolsk |
| Omsk | Vladivostok |

LAKES

| | |
|---|---|
| Aral | Baikal |

MOUNTAINS

| | |
|---|---|
| Altai | Ural |
| Stanovoi | Yablonoi |

RIVERS

| | |
|---|---|
| Amur | Syr-Darya |
| Lena | Yenisei |
| Ob | |

UNCLASSIFIED

| | |
|---|---|
| Fur and Fur Trade | Russia |
| Kamchatka | Trans-Siberian Railway |
| Reindeer | Tundra |

**SIBYL,** *sib'il,* in Greek and Roman mythology, a prophetess who owed her divine gift to Apollo. The most famous was the *Cumaean sibyl,* who, so the story goes, appeared before King Tarquin the Proud and offered him nine books for sale. This offer he refused, and a second offer, after she had destroyed three books, was also declined. When she appeared before him the third time, with but three books left, he bought them, paying the price she had asked for the nine. These three books were kept in the temple of Jupiter, and when it was burned in 83 B.C. they were likewise destroyed. A collection of sibylline verses was then assembled from the cities of Greece, Italy and Asia Minor, and deposited in the new Temple of Jupiter Capitolinus. The sibylline literature was consulted when it was deemed necessary to conciliate the gods.

**SICILIES,** *sis'i lis,* Kingdom of the Two, a former kingdom of Italy, comprising Naples, or Southern Italy, and the island of Sicily. The name Kingdom of Naples was also often used. The island and the lower part of the mainland had much the same history from the earliest times; both came successively under Greek, Roman, Ostrogoth and Saracen domination, and about the middle of the eleventh century both were invaded by the sons of the Norman knight, Tancred. Robert, the elder, made conquests in Southern Italy, and Roger gained possession of Sicily; and under Roger II, son and successor of Roger I, further gains were made on the mainland, and the two dominions were united and called the Kingdom of the Two Sicilies. Roger II left no male heir, and through his daughter, the wife of Emperor Henry VI, the kingdom came under the dominion of the Hohenstaufen.

This House was overthrown in 1266, and the Two Sicilies fell to Charles of Anjou, brother of Louis IX of France. The rule of Charles was most oppressive, and in 1282, by means of the so-called Sicilian Vespers, Sicily threw off the yoke of the family of Anjou and became subject to Pedro III of Aragon. Thus the two parts of the kingdom were separated, and though they were reunited for a few years after 1442, they were again divided and remained so until early in the sixteenth century, when they came under the domination of Spain. Spanish rule was cruelly severe, and insurrections were frequent.

In 1707 Austria succeeded in gaining possession of Naples, by the War of the Spanish Succession, while Sicily was given to Savoy; but in 1720 Savoy gave up Sicily to Austria, receiving in exchange Sardinia. Fourteen years later Don Carlos, son of Philip V of Spain,

by a successful invasion made himself king of the Two Sicilies, thus inaugurating the reign of the Bourbon family. When the French Revolution broke out, and French armies began to overrun Europe, Ferdinand, king of the Two Sicilies, joined the coalition against France, and was for a time deprived of the mainland part of his kingdom; reinstated, he again lost Naples, this time to Napoleon, who placed on the throne first his brother Joseph and, later, Joachim Murat. After Napoleon's downfall the two parts of the kingdom were reunited.

Various revolts occurred in the succeeding decades, but Austria forbade any concession on the part of the sovereigns to the people's demand for liberal government. Francis I, Ferdinand II and Francis II did not need the backing of Austria to make them despotic, and their continued cruelties prepared the people to welcome the advent of Garibaldi and his forces, through whose efforts they were freed and made a part of the new kingdom of Italy, as is related in the article ITALY. A.MC C.

Consult Freeman's *History of Sicily from Earliest Times.*

**Related Subjects.** The following articles in these volumes will make clear certain references in the above discussion and will give added information:

| | |
|---|---|
| Ferdinand II and IV | Naples |
| Garibaldi, Giuseppe | Sicily |
| Hohenstaufen | Succession Wars |
| Italy, subtitle *History* | Tancred |

**SICILY,** *sis'i li,* a mountainous island in the Mediterranean Sea, separated from the mainland of Italy, of which it is politically a part, by the Strait of Messina. An examination of the accompanying map will show that Sicily lies opposite the toe of the "boot," and that it is an irregular triangle in shape. This island, with an area of 9,935 square miles, is the largest in the Mediterranean, and is nearly three times the size of Porto Rico. In 1911 it had a population of 3,672,258. In past geologic ages it was a part of the mainland, and, like the Italian peninsula, it has a chain of mountains extending through it. Beautiful Mount Etna, which rises near the eastern coast to a height of 10,750 feet, is the loftiest peak on the island—like Mount Vesuvius, a perpetual reminder of the uncertainty of life. There are no rivers of commercial importance and few lakes, but mineral springs occur in many places. Sicily has a fairly even climate, though the sirocco, with its burning heat, sometimes visits the island.

The mountain slopes and foothills are covered with lemon, orange and olive groves and with vineyards, and on the flat table-lands cereals are raised, but Sicily has lost its name of "the granary of Italy," because the yield of cereals is sufficient only for the needs of the people of the island. Deep-sea fishing furnishes tunny fish, sardines, coral and sponges, and great quantities of sulphur are mined. Sulphur, fruits, vegetables, salt, wine, oil and

LOCATION MAP

The small corner map shows the geographical position of the island with respect to the peninsula of Italy.

fish are the chief exports. The three chief ports are Palermo, Catania and Messina. The people are for the most part illiterate and very poor, although there are a few wealthy landowners. In the mountain fastnesses a few picturesque brigands still survive.

Situated as it is between Europe and Africa, the island has been a battle field for the two continents. The first settlers in Sicily, probably invaders from Italy, were conquered by the Greeks, who founded colonies—Naxos, Syracuse, Agrigentum and others—and introduced Greek culture into the island. The traveler in Sicily to-day finds everywhere traces of that Greek civilization—the crumbling ruins of temples and tombs with their sculptured marbles and friezes. As each of three great empires of antiquity grew into power, Phoenicia, Carthage and Rome, it included Sicily in its conquests. The Goths and Vandals, barbarian hordes from the north, drove the Romans out of Sicily, to be themselves driven out when Belisarius conquered the island and annexed it to the Byzantine Empire. Byzantine rule was replaced by Saracen and that in turn by Norman. For a continuation of the history of Sicily, see SICILIES, KINGDOM OF THE TWO. B.M.W.

Consult Crawford's *Southern Italy and Sicily, and Rules of the South.*

**Related Subjects.** The following articles in these volumes will furnish additional information:

| | |
|---|---|
| Catania | Palermo |
| Etna | Sirocco |
| Messina | Sulphur |

**SICKLE,** *sik'l,* a reaping implement, having a short handle with a curved blade of steel, the edge of the blade being in the hollow, or inner, side of the curve. The sickle is the oldest of reaping instruments, and is still in use for gathering crops in some countries. In America it is now mainly used for trimming the edges of lawns, where a scythe or mower cannot be used. In using the sickle the workman grasps the handle in the right hand and holds with the left as much grass as the implement can cut with one stroke. For general use in the harvest the sickle gave way to the cradle, which in turn was superseded by the mowing and reaping machines. See SCYTHE.

**SIDDONS,** *sid'unz,* SARAH KEMBLE (1755-1831), the most famous English actress of her time, was born in the "Shoulder-of-Mutton" inn at Brecon, Wales. Her professional life began so early that she herself declared it was impossible to remember the time when she was not on the stage. When eighteen years old she married an actor, William Siddons, and the couple played in various country towns. Her first triumph occurred at Cheltenham, England, in 1774. Some members of the nobility there attended her performance of Belvidera in Otway's *Venice Preserved* with the avowed purpose of ridiculing her, but instead, they applauded. They praised her to David Garrick, the actor and manager of Drury Lane theater, London, and he engaged her to act for him at twenty-four dollars a week. She was unsuccessful, and in 1777, returned to the theaters of the rural towns.

After five years of earnest work, she was invited to return to Drury Lane, where her appearance in October, 1782, as Isabella in Southerne's *Fatal Marriage* gave her one of the greatest triumphs ever seen in a British theater. Mrs. Siddons afterwards acted many famous classic rôles, such as Desdemona, Ophelia and Queen Catherine in Shakespeare's *Henry VIII,* but the nearest she ever approached to the power of her Lady Macbeth was as Volumnia in Kemble's *Coriolanus.*

She died in London on June 8, 1813, and was buried in Paddington Churchyard in that city.

**SIDEREAL,** *si de'ri al,* **TIME,** time measured by the apparent motion of the stars. In reality a *sidereal day* is the exact time taken by the earth in revolving once on its own axis. This time is equal to that between the passage of any particular star across the meridian and the beginning of its next passage, amounting to 23 hours, 56 minutes, 4.8 seconds. A *sidereal year* is the period in which the earth revolves once around the sun, or in which a star apparently completes its revolution, returning to the same place in the heavens. The length of the sidereal year is 365 days, 6 hours, 9 minutes, 9 seconds.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Chronology | Earth |
| Day | Time |

**SIDNEY,** *sid'ni,* SIR PHILIP (1554-1586), an accomplished British courtier, poet and soldier who was a popular idol during part of the reign of Queen Elizabeth. Being the nephew of Dudley, Earl of Leicester, his career at court was assured, and he was most favorably received by the queen, who employed him in important missions. Offending her, however, by his outspoken objection to her proposed marriage with Henry, Duke of Anjou, Sidney was compelled to retire from the court for a few months, during which he wrote his *Arcadia* and various poems for the entertainment of his sister, the Countess of Pembroke. Elizabeth's anger soon abated; he was restored to favor and forbidden to sail with Sir Francis Drake against the Spaniards, as the queen said she could not spare the "jewel of her dominions."

While serving as governor of Flushing, he was mortally wounded at the battle of Zutphen. As he was being borne off the field he complained of thirst and water was brought to him. Seeing the wistful look on the face of a mortally wounded soldier, Sidney handed over the water, saying simply, "Thy need is greater than mine."

Sidney's death was greatly mourned. His body was taken to England and buried with great ceremony in Saint Paul's Cathedral. His poetry, though full of the extravagant fancies of the time, is of considerable beauty, but he was beloved in life and is now chiefly remembered for his purity of mind and conduct and his near approach to the ideal gentleman.

Consult Addleshaw's *Sir Philip Sidney;* Greville's *Life of Sir Philip Sidney.*

**SIDON,** *si'dun,* in ancient times one of the leading cities of Phoenicia, situated on the Mediterranean shore twenty-five miles south of Beirut (see colored map, opposite page 417).

At various times it held the supreme place in the Phoenician confederacy, alternating with Tyre in this rôle. Sidon was famed for its purple dyes, and its people, who are mentioned in Homer's writings, were skilled traders and artisans. There is a tradition that they manufactured glass from the fine sand of the Belus River, and Pliny credited them with the discovery of the process. A number of magnificent sarcophagi have been found in the vicinity. The modern town of Saida, a place of about 12,000 people, occupies a portion of the site of the ancient city. See PHOENICIA; TYRE.

**SIEGE,** *seej,* a word derived from the Latin *sedere,* meaning *to sit.* Literally, a siege consists in stationing an army before a defended place for the purpose of taking it by assault or by starving it into surrender. The first object of the besieging force is to invest or surround the position, to prevent outside help or supplies from reaching the besieged. If time is not of great importance, and submission through starvation is sought, the besieging force may content itself with only such operations as are necessary to repel sorties by the garrison. If there is danger of a relieving force arriving in strength sufficient to give battle to the besiegers, the operations must be more vigorous. Artillery must be placed at important and commanding positions and the attackers must advance to the assault, or from trench to trench dug parallel to the works of the enemy. The digging of the trenches is a difficult and dangerous undertaking and must be carried on under cover of artillery and rifle fire or at night. The besieged, meanwhile, use their utmost endeavors to prevent the nearer approach of the besiegers.

In reducing a city by artillery fire, called *bombardment,* special guns are used, more powerful than those with the army in the field. For siege guns in the United States service modern 7-inch howitzers, mortars and long 5-inch siege guns have been adopted. The 5-inch gun is also much used in Europe when there is not time to bring up heavier guns which cannot possibly travel with the army. The 5-inch guns weigh about 3,660 pounds, are 12.15 feet in length and fire a shell 45 pounds in weight. The big siege guns, used first by the German army in 1914, have an effective range far greater than any previously known siege gun, and practically rendered besieging an unnecessary operation.

**Modern Siege Methods.** Modern siege tactics have undergone considerable change since the methods adopted by the Japanese proved effective at Port Arthur in the Russo-Japanese War. The heavy guns used by the Germans at the outbreak of the War of the Nations in 1914 have proved that however strong positions may be, and however well protected the forts, the weight of metal will eventually batter down the defenses. In fact, it may be safely stated that sieges, in the old way, will not again be prominent in warfare. What the Japanese accomplished by zigzag trenches, which exposed the least possible space to gunfire, the Germans in Belgium accomplished by bombardment and assault.

An army now caught in any town, however strongly fortified, would be better employed in fighting its way out than in attempting to prevent the enemy getting in. By the constant nearer approach of trenches, by utilizing all natural means of defense and concealment, modern armies accomplish in a week what could hardly be done in months in any previous wars. The modern siege guns, with a range of 12,000 yards (about seven miles), cover the advance of attacking infantry in a way hitherto unheard of in siege tactics.

**Famous Sieges.** The most famous sieges of the last century are those of Paris in 1871; Plevna, 1877; Mafeking, 1899-1900; Port Arthur, 1904; Przemysl, 1914-1915. In the first stage of the War of the Nations in 1914, the siege of Antwerp was characterized by none of the principles of siegecraft. Weight and numbers and long range of guns rendered it impossible for the besieged to offer strong resistance, and also made it unnecessary for the besiegers to resort to any delaying tactics of gradual approach. Antwerp was taken by the Germans in eleven days, whereas by former siege methods and appliances six months might have been required, if, indeed, success were at all possible, for the fortifications of Antwerp were among the strongest in the world. The Russian siege of Przemysl was stubbornly contested for six months, at the end of which time the Austro-German garrison surrendered. It was the sixth longest siege in history.

The greatest sieges recorded are the following:

1779-81—Gibraltar, three years, seven months, twelve days. Relieved.
1856—Sebastopol, 335 days. Fell.
1857—Delhi, 131 days. Relieved.
1857—Lucknow, 149 days. Relieved.
1862-63—Vicksburg, 186 days. Fell.
1864-65—Richmond, 287 days. Evacuated.
1870—Metz, 134 days. Fell.

1870-71—Paris, 135 days. Fell.
1877—Plevna, 144 days. Fell.
1899-1900—Ladysmith, 120 days. Relieved.
1905—Port Arthur, 241 days. Fell.
1912-13—Adrianople, 155 days. Fell.
1914-15—Przemysl, 185 days. Fell. F.ST.A.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Antwerp | Port Arthur |
| Franco-German War | Russo-Japanese War |
| Lucknow | War of Secession |

**SIENKIEWICZ,** *shen kya' vich,* HENRYK (1842-1916), a Polish novelist, best known as the author of *Quo Vadis,* a vivid story of ancient Rome in the days of Nero. It has been dramatized both for the regular stage and for the moving-picture theaters, and always with telling effect. Sienkiewicz possessed in a remarkable degree the power to visualize historic scenes and characters, and his stories are intensely interesting and powerfully emotional. He was born in the province of Siedlce. After his student days at the University of Warsaw he visited California, writing an account of his journey in a series of letters published in the *Polish Gazette.* His first novel, *The Tatar Bondage,* published in 1880, was a great success, and was followed by a trilogy having as a background the struggle between the Poles and Cossacks. The three books of this series are entitled *With Fire and Sword, The Deluge* and *Pan Michael.* Among his other widely-read novels are *Children of the Soil,* a story of contemporary Polish life, and *Knights of the Cross,* which deals with the conflict between the Poles and the Teutonic Order of Knights. The latter appeared in 1904, and the following year the author received the Nobel prize for literature. When the war in Europe broke out Sienkiewicz devoted most of his time to Polish relief work. He died in Switzerland, while on a mission for his prostrate country.

Consult Phelps's *Essays on Modern Novelists.*

**SIERRA LEONE,** *se er' a le o' ne,* a British colony on the west coast of Africa, founded in 1791 (after an unsuccessful first attempt in 1787) by a group of English philanthropists as a refuge for fugitive negro slaves (see colored map in the article AFRICA, opposite page 81). It became a Crown colony in 1807. About 30,000 square miles of country east of the colony, populated by pagan negro tribes to the number of about 1,403,000, form a province that is under the protection of Great Britain and is called Sierra Leone Protectorate. The coast colony has an estimated area of 4,000 square miles and a population of 75,572.

The country is hilly, well wooded and well watered, and the coast regions are very unhealthful. There are valuable woods in the forests, chiefly teak, ebony and rosewood, and many wild animals, including elephants, leopards, panthers, monkeys and buffalo; in the rivers are crocodiles and hippopotamuses, and serpents, especially boa constrictors, are numerous. Freetown, the capital, has a population of perhaps 500 Europeans and about 37,200 negroes; the latter represent all tribes and they speak a universal language called "pidgin" English. The principal exports include rubber, palm nuts and oil, ginger and pepper.

**SIERRA MADRE,** *se er' a mah' dra.* The name is given to a number of mountain ranges in territory that was once Spanish, and also to a range in Spain. The best known are in Mexico and the Philippines. In Mexico there are the Western (Occidental) Sierra Madre and the Eastern (Oriental) Sierra Madre, the two ranges which border the great plateau. The Oriental range is a part of the Rocky Mountains system; it is lower than the Occidental, and less rugged.

**SIERRA NEVADA,** *se er' a ne vah' da,* a chain of mountains in Southern Spain, extending from the province of Granada into the province of Almeria, a distance of about sixty miles. They lie south of the Guadalquivir valley, twenty-eight miles from the Mediterranean. The Sierra Nevadas are so named because many of the peaks are over 10,000 feet high, and are covered with perpetual snow; the name is the Spanish for *snowy range.* Mulhacén, 11,420 feet high, is the loftiest peak in Spain. The mountains rise abruptly from the plain, and at their base are orchards of olives, chestnuts and oranges, but the slopes are almost entirely bare rock.

**SIERRA NEVADA,** the highest and steepest mountain range in the United States, extending north and south for more than 400 miles through Eastern California. To the west of the range are the valleys of the Sacramento and San Joaquin rivers, and to the east lies the Great American Basin. The highest peak in the United States proper, Mount Whitney (14,448 feet), belongs to the Sierra Nevada range, and there are many others more than 10,000 feet above the sea. Among the places in the Sierra Nevada famous for beautiful scenery is the Yosemite Valley (see YOSEMITE NATIONAL PARK). A more extended description of the mountains may be found in these volumes in the article CALIFORNIA (see page 1057).

**SIEYÈS,** *sya yes'*, EMMANUEL JOSEPH (1748-1836), a French revolutionist, born at Fréjus. He was educated at the University of Paris, and prepared himself for the priesthood. In 1775 he was appointed a canon in Brittany and rose rapidly to the post of vicar-general. He was in Paris in 1789 and at that time took a most active part in furthering the French Revolution. On June 16, as a member of the States-General, he proposed that that body form itself into an organization to be called the National Assembly; this was done, and Sieyès was chosen its president in 1790. In the next year many violent leaders, among them Danton, Robespierre and Saint-Just, went to such extremes in their harsh methods of government that his conscience would not permit him to follow them, and he became almost a silent member of the Assembly, simply recording his vote in important matters.

After the close of the Reign of Terror, Sieyès did important work in the department of foreign affairs, and in 1798 went as ambassador to Berlin, where he inspired much confidence in the Prussian court. In 1799 he was elected a member of the Directory of Paris, and greatly aided the movement for peace by closing the Jacobin Club (see JACOBINS). On November 9, 1799, he formed what was called a consulate, of which he and Napoleon were members. No man, however, could oppose the will of Bonaparte, and after a few disagreements Sieyès retired from the consulate with a gift of $120,000, an estate, a seat in the Senate and the title of Count of the Empire.

His famous book, *The Exposition of the Rights of Man and of the Citizen,* is a clear and precise statement of man's relations to man, and undoubtedly influenced Jefferson and other American political thinkers at the time the United States Constitution was being constructed.

**SIFTON,** the family name of two brothers who distinguished themselves in Canadian affairs.

**Arthur Lewis Sifton** (1858- ), a Canadian statesman and jurist, first chief justice and later premier of the province of Alberta. Sifton was born at Saint John's, Ont., and was educated at Wesley College (Winnipeg) and at Victoria University (at Cobourg). After leaving the university he went to the Northwest, where he was admitted to the bar in 1883. From 1899 to 1903 he was a Liberal member of the assembly of the North West Territories, and for the last two years of the period was also commissioner of public works in the Haultain administration. He was then for two years chief justice of the supreme court of the North West Territories, and from 1905 to 1910 was chief justice of Alberta. In 1910 he became premier of Alberta, in succession to Alexander C. Rutherford. Sifton's administration was concerned chiefly with railroad matters, particularly the subsidies, in one form or another, which had been and were to be granted.

**Sir Clifford Sifton** (1861- ), a Canadian statesman, who, as Minister of the Interior in the Laurier Ministry, framed the policy of advertisement and exploitation of the northwest which resulted in a flood of immigration unprecedented in Canadian history. Like his elder brother, Arthur (which see), Sir Clifford was born in Ontario, and attended Victoria University, from which he was graduated in 1880. He removed to Manitoba, was called to the bar in 1882, and for a number of years practiced at Brandon. From 1888 to 1896 he was a Liberal member of the Manitoba assembly, and from 1891 to 1896 was also attorney-general in the Thomas Greenway administration. As attorney-general he carried through the act codifying civil procedure in the province. He was a conspicuous opponent of the Dominion government's policy in attempting to establish separate schools in Manitoba.

In 1896 he entered the field of Dominion politics as Liberal member of the House of Commons and Minister of the Interior and Superintendent of Indian Affairs. Two years later he introduced and carried a measure granting responsible government to the North West Territories. He also hit on the simple plan of advertising the Territories in order to draw immigrants. In 1905 he resigned from the Ministry because he and Sir Wilfrid Laurier could not agree on certain educational questions affecting the Territories. In 1909 he was appointed chairman of the Canadian Conservation Commission, an office which he has made one of the most important outside the Ministry in Canada. He was created a Knight Commander of the Order of Saint Michael and Saint George (K.C.M.G.) in 1915. W.F.Z.

**SIGISMUND,** *sij'is mund* (about 1368-1437), Holy Roman Emperor from 1411 to 1437. He was the son of Charles IV, and was married to Mary of Hungary, on the death of whose father in 1387 he became king of Hungary. In a campaign against the Turks in 1396 he was utterly defeated, and five years later a popular insurrection drove him from the throne. He re-

gained his power by the aid of hired troops, and after that time seems to have encountered no effective opposition.

As Holy Roman Emperor he convened the Council of Constance, to put an end to the Hussite controversy; and his desertion of John Huss, whom he had promised to protect, is a stain on his memory. From 1419 to 1436 he was engaged in a terrific struggle in Bohemia, which was finally terminated by the acknowledgment of Sigismund as king of that country.

**SIGNAL CORPS,** *kohr,* a branch of the army which has been called the eyes and nerves of the service. In the early days of the American War of Secession (1861-1865) the members of the signal corps were derisively referred to as "flag-floppers"—a term changed only a little later from derision to respect and admiration. In modern warfare an army without its signal corps simply could not exist; with expert signalers, an army or armies occupying a front extended over 150 miles of territory may be made to maneuver as one man. The members of the Signal Corps are experts in every known means of communication, by day or by night, by the flicker of a match visible only at a few yards, by the use of flags, by the heliograph or by wireless telegraphy, across oceans and continents. By far the most modern aid to armies is the military aircraft.

**Signaling by Aircraft.** At the commencement of the War of the Nations, in August, 1914, all the world wondered what part would be played in the war by aeroplanes and other aircraft. It was soon discovered that as aids to the armies the importance of the aerial forces cannot be overestimated. For scouting, ascertaining and reporting the position and strength of the enemy and the disposition of his artillery, the signalers of the air have proved invaluable. At long ranges, the guns of the enemy are invisible, and only by the signals from the daring air scouts can the correct range be found. While bombs may be thrown from aircraft and inflict damage, the greatest efficiency of the aerial forces lies in their coöperation by signal with the artillery and the army generally. The daring of the air signalers of all nationalities engaged in the war was remarkable. The appearance of an aeroplane was the signal for bombardment. Yet day after day the signalers returned to their duty, even engaging themselves in deadly battles several thousand feet above the earth, sacrificing their lives in the endeavor to give their friends below the much-needed signals.

The history of the signal corps of the United States army dates from 1860, when Major Albert J. Myer was appointed chief signal officer. In 1863 the Signal Corps became a separate and complete organization, efficient in land and naval service. After being for a time attached to the Weather Bureau, the Corps was again reorganized in 1891, with William B. Hazen at its head, when it consisted of ten commissioned officers and fifty enlisted men ranking as sergeants. To Hazen much credit must be given for bringing the corps to its present efficient state. F.ST.A.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Army | Navy |
| Flag | Telegraph, subtitle |
| Flying Machine | *Wireless Telegraph* |
| Heliograph | Weather Bureau |

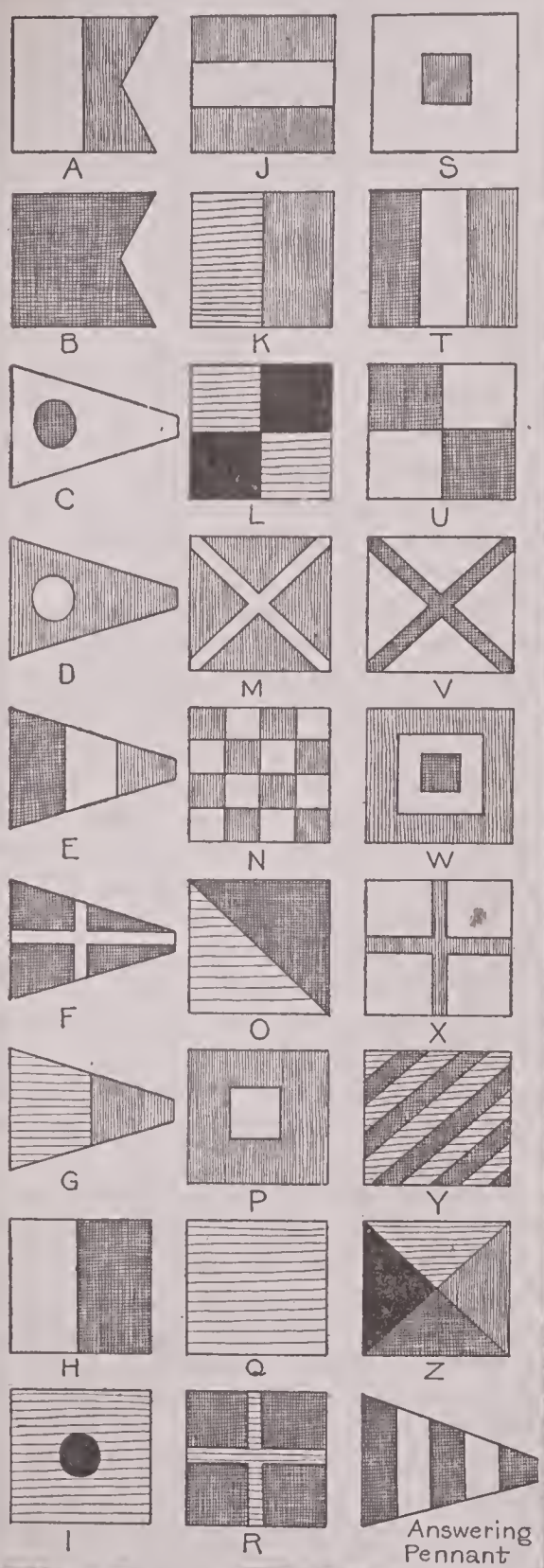
**SIG'NALING,** the art of conveying messages by means of audible or visible signs to distances beyond the reach of the human voice. The most perfect form of modern signaling is by electricity, and the wireless telegraph has revolutionized the signal systems of the world. Previous to its introduction ships at sea were cut off from the world till they reached port. Now constant communication is maintained, and passengers on board modern liners may be well informed on current events.

Signaling between ships at sea, although now largely by wireless telegraph, is also carried on by flag signals according to an international code, which discloses the meaning of every flag or combination of flags displayed. This code was adopted in 1901, by international agreement. There are twenty-six code flags and an answering pennant to give warning of the hoisting of a flag message, and also to signify that the message is understood.

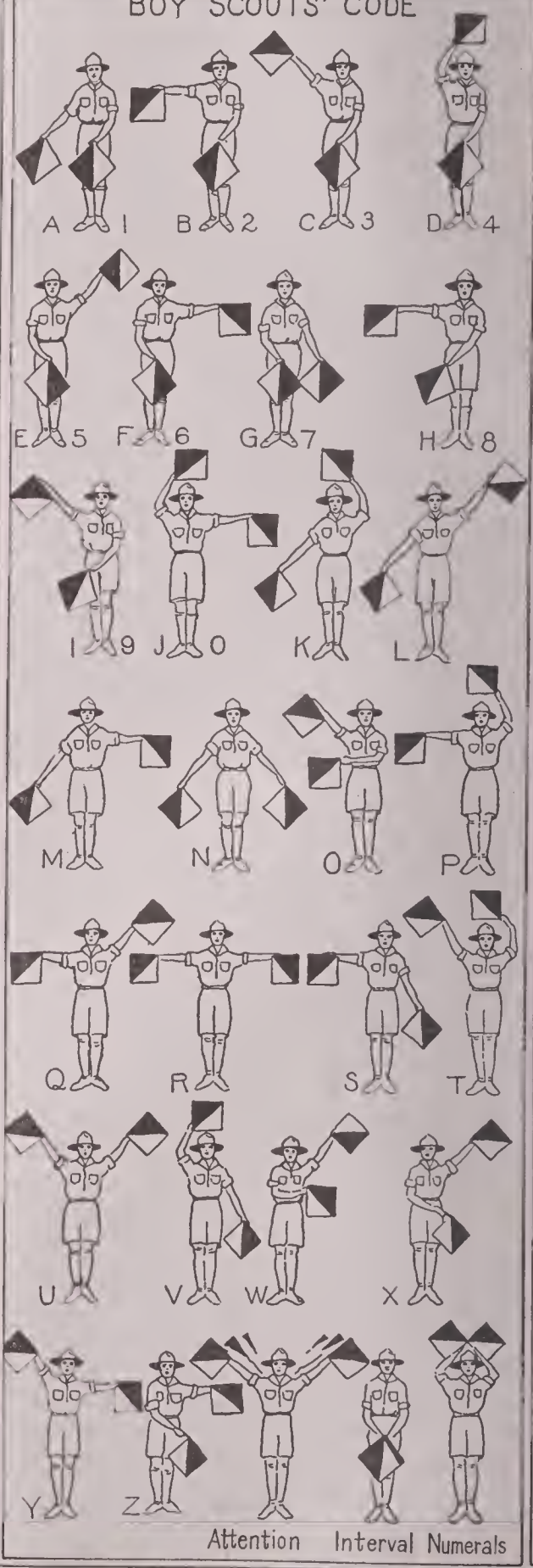
In time of war signaling is of the utmost importance, as on the concerted movement of troops may depend the issue, and movements must be directed according to information received. A common form of signaling is what is called "wigwagging," or waving a flag or flags which in certain positions mean certain letters or words, according to a code. Field telegraphs and telephones are also used, the necessary wires being laid with great rapidity by mounted men. The danger of wires being cut or "tapped" by the enemy renders their usefulness uncertain. The heliograph has proved most efficient, and the light signals flashed by this instrument can be seen and read at a distance of many miles through field glasses. In the use of the heliograph the Morse telegraph code, a series of dots

# SIGNALING

## INTERNATIONAL CODE




## BOY SCOUTS' CODE



and dashes, or short and long flashes, is generally used, and to prevent the enemy from profiting by the messages sent, which he may read if the flashes are visible to him, a special code is used in which the words as signaled have quite a different meaning from their usual significance. This is particularly true when messages are sent from airships, as was common in the War of the Nations.

At night, lamps may be used in the same way as the heliograph by day. A shutter covering the light is removed for a short or long flash, according to the Morse code. In cases where barbed wire fences and entanglements are used, messages may be sent the extreme length of the wire merely by tapping the wire with a stick or piece of metal. Wigwagging signals may also be sent by mechanical appliances in which wooden or metal arms are moved up and down. See HELIOGRAPH; SIGNAL CORPS.

Consult United States Army *Signal Book;* Myers' *A Manual of Signals.*

**SIGN LANGUAGE,** *sine lang'gwayj.* The language of signs was used long before the written history of mankind began. It was the earliest means of communication, employed in the childhood of the race, when the use of symbols and significant gestures was necessary to convey an idea or interpret a message. This primitive method of communication is still used by American Indians of different tribes, who have no common language. For example, the breaking of a strong stick signifies *strength,* and the drawing of the finger across the forehead, to indicate the presence of a cap, represents *white man.* Among other peoples gestures often take the place of words, although they have a spoken language. Charles Dickens, in his account of Italy and its peoples, describes the pantomime language of the streets of Naples, where the conventional sign of hunger is the rapping of the chin:

"Two people are in passing carriages; one touches his lips, twice or thrice, holding up the five fingers of his right hand, and gives a horizontal cut in the air with the palm. The other nods briskly and goes his way. He has been invited to a friendly dinner at half past five o'clock and will certainly come."

The language of signs has been used since the sixteenth century in the education of the deaf. The early teachers conveyed ideas by the use of gestures, position, facial expression and mimic acting, which the pupil was taught to imitate. Many of the signs employed were the same natural expressions used by the Indians—the movement of the hand to the mouth to indicate food, the bowing of the head to represent sorrow or suffering, etc. The manual alphabet, by which letters are interpreted by the position of the fingers, was later introduced, but this spelling with the hands is not properly a sign language (see DEAF AND DUMB).

There are many systems of signs or signals employed in sending messages, such as the wigwagging of flags used in the army, with which every boy scout is familiar; signaling by means of kites; and the flag system used by the government bureaus to indicate the weather (see SIGNALING).

**SIGSBEE,** *sigs'bi,* CHARLES DWIGHT (1845- ), an American naval officer, in command of the *Maine* when it was destroyed in 1898 in Havana harbor. He was graduated at the United States Naval Academy in 1863, in time to have a share in the Battle of Mobile Bay, in the War of Secession, and during the last year of the war served with the North Atlantic squadron. Later he did brilliant work in connection with deep-sea soundings in the Gulf of Mexico. The year before the outbreak of the Spanish-American War Sigsbee was promoted to the rank of captain. His cool and courageous conduct at the time of the disaster to the *Maine* was highly praised, and he was assigned to the command of the auxiliary cruiser *Saint Paul* for the period of the war with Spain. In 1903 he was promoted to be rear admiral, and four years later he retired. Sigsbee is the author of *Deep Sea Sounding and Dredging* and *The Maine: An Account of Her Destruction in Havana Harbor.*

**SIGURD,** *ze'goort,* in northern mythology, the brave warrior and hero of the *Volsunga Saga,* who vowed in true knightly fashion to right all evil and defend the oppressed. He was the son of Sigmund and Hiordis, but was raised in the brilliant court of his stepfather, Elf. Incited by the stories of Regin, his tutor, the young gallant, after receiving his father's sword, started out to destroy the dragon Fafnir. After killing the monster he ate its heart and was surprised to find that he could understand the language of birds. They told him about Brunhilde, the beautiful maiden who slept in a palace surrounded by flames, awaiting the hero who would come to rescue her. Sigurd immediately mounted the hill to the palace, awakened the imprisoned Brunhilde, whom he loved at first sight, and after promising to return for her, he started off again on his adventures. She was left sorrowful.

Finally he reached the land of the Niblungs, where the queen, who was a sorceress, brewed for Sigurd a potion which caused him to forget Brunhilde and fall in love with her own daughter, Gudrun, whom he married. Later, after he had aided Gudrun's brother, Gunther, to win Brunhilde as his wife, Sigurd's memory returned and he was filled with remorse. Brunhilde, unable to forgive his apparent faithlessness, had him put to death and then in remorse killed herself on his funeral pyre. An extract from William Morris' *Sigurd the Volsung* describes the death of the hero:

"It is Brynhild's deed," he murmured, "and the woman that loves me well;
Naught now is left to repent of, and the tale abides to tell.
I have done many deeds in my life-days; and all these, and my love, they lie
In the hollow hand of Odin till the day of the world go by."

**SIKHS,** *seeks,* meaning *disciples,* is the name of a religious sect in Northwestern India, which worships one invisible god. The sect was founded by Nanak Shah (1469-1539), who tried to unify the Hindu castes and unite them with the Mohammedans into one great brotherhood.

The political state of the Sikhs was established by Guru Govind. He developed their military power that they might defend themselves from the Mohammedans and other religious classes, but after his death in 1708 his followers were overcome by the Moslems. A few of the Sikhs, however, escaped to the mountains, and in a few years returned and subdued Lahore. They established independent communities which were united in 1792 by Ranjit Singh, a despot who assumed the title of *maharajah* and governed a territory including all of the Punjab and Multan and other adjoining regions with a total area of 70,000 square miles. After his death, the Sikhs came into conflict with the British government in India. In the First Sikh War (1845-1846) they were defeated and forced to give up Lahore. In 1848, during the Second Sikh War, they were completely conquered and their possessions were added to British India.

In the Sepoy Rebellion of 1857, the Sikhs supported the English, chiefly through fear that the Mohammedan power might be restored in India. Numbering over 3,000,000, this sect forms the larger part of the inhabitants of the Punjab. They are a strong, courageous people, and are chiefly engaged in agriculture.

Consult Gough and Inness's *The Sikhs and the Sikh Wars;* Cunningham's *History of the Sikhs.*

**SI-KIANG',** or **HONG-KIANG',** the most important river of Southwestern China, has its source in the province of Yunnan and flows in a southeasterly direction for 1,650 miles, discharging through its delta into the South China Sea. Canton, one of the largest cities in China, is situated on one of the arms of the Si-kiang. The river is of considerable commercial importance through its tributaries and a network of canals. It is navigable for the largest vessels as far as Wuchow, and from Wuchow to Samshui for lighter craft. Rapids interrupt navigation in the upper course.

**SILENUS,** *si le' nus,* in Greek mythology, a demigod, the most distinguished of the satyrs. He was the nurse, teacher and follower of Bacchus. He is represented as very fat, bald and pug-nosed, riding on a broad-backed ass. He is usually pictured as intoxicated, swaying about, and brandishing his drinking cup. See SATYR.

**SILESIA,** *si le' shi a,* formerly a province in Prussia and economically one of the important states of the old German Empire. It contained the richest coal deposits in Germany, and ranked next to Saxony, among the Prussian

LOCATION OF SILESIA

provinces, in value of agricultural products. At the conclusion of the War of the Nations the province was claimed both by Poland and the Ukraine, on the basis of "self-determination of peoples." The peace conference of 1919 felt it proper to divide the province between the two new states, but promised that the people might decide the matter by vote.

The province was in the extreme southeastern part of Prussia. It had an area of 15,569 square miles and was drained by the Oder River system. In the southern part there are several mountain ranges, and here lie the coal fields. The greater part of the agricultural district lies between the Oder and the southwest-

ern mountain ranges. Rye, oats, wheat, barley, potatoes and beets are raised in large quantities. Silesia was also an important manufacturing state, holding first rank among the Prussian provinces in the weaving and spinning of flax. Population in 1910, 5,225,962.

**Related Subjects.** The reader is referred to the following articles in these volumes:

Frederick, subhead
*Frederick II*
Prussia
Versailles, Treaty of

**SILICA,** *sil'i ka,* one of the most widely distributed substances in the earth. Sand, quartz, gravel and sandstone are composed almost entirely of silica. It occurs also in granite, clay, slate, mica, feldspar and other rocks. It is found in the stalks of grasses and grains, to which it imparts strength and toughness. It also imparts similar qualities to the quills of birds and to living sponges.

Silica is a chemical compound of silicon (which see) and oxygen. It occurs both in crystalline and in amorphous (irregular) forms; that is, without definite structure. Amorphous silica is a soft, white powder, insoluble in water and all acids except hydrofluoric acid. Quartz is the best example of crystallized silica. Many precious stones, like amethyst, jasper and cat's-eyes, are crystallized silica delicately colored in various shades and tints. Other precious stones, like opal, onyx, agate and chalcedony, are amorphous silica variously colored. Flint is an amorphous silica colored black or dull brown.

**Related Subjects.** The reader is referred to the following articles in these volumes:

Crystallization
Gems
Quartz
Sand
Sandstone

**SILICON,** *sil'i kon,* a nonmetallic element, the most abundant in nature with the exception of oxygen, although it does not occur uncombined. Natural silica, or silicon oxide, is the principal constituent of quartz, flint, sand, amethyst, agate, jasper, opal and many other rocks, in most of which it occurs in the form of crystals. Silicon occurs also as a brown powder, which will burn in air and chlorine, and is soluble in alkalies. The chemical symbol for silicon is *Si.* See Silica.

**SILK,** a lustrous fiber produced by the most useful insects known. The threads that form the beautiful and costly silk fabrics of our markets are taken from cocoons spun by thousands of little creatures whose ceaseless activity makes possible one of the world's great textile industries. Silk fabrics are among the handsomest and richest textiles used by mankind, and such is the esteem in which they have always been held that writers use the term as a symbol of the luxury and elegance of the most splendid civilizations.

**The Silkworm.** The humble creator of this rarest of textile fabrics is the silk moth, an insect with a short, blunt body, stout legs and broad, white wings, marked by several black lines running parallel with the borders. Its spread wings measure about two inches from tip to tip. The female moth lays her eggs in the early summer, depositing from 200 to 500 bluish eggs about the size of a pin's head and gluing them together with a gummy secretion. In a wild state, the moth lays her eggs on the mulberry tree; but under cultivation, she is provided with bits of paper or muslin.

The eggs hatch during the following spring, the larvae being about a quarter of an inch long when they emerge. They are voraciously

hungry, and soon consume about their own weight of chopped mulberry leaves as a daily ration. Naturally, they grow with great rapidity, and cast their first skin after a period of about ten days. This process is repeated about four times during a period of six weeks, when the caterpillar is ready to spin its cocoon. It is then three inches long and half an inch in diameter. The body is in twelve segments and is supported by three pairs of true legs and five pairs of hooked prolegs on the hind segments.

The caterpillar now ceases to eat and presently begins spinning its cocoon. In a natural state, it sews two leaves together and spins the cocoon between them; but under cultivation, the worm is supplied with a rack containing numerous small cells, to the sides of which the cocoon is attached. The outer covering, or floss, is first spun, and then the silk is wound in a continuous thread about the body, the worm shrinking in size as it thus spins out its substance. The film is formed from a gluelike material secreted in two glands, one on either side of the body, connecting with an opening in the upper lip called the spinneret. The sticky fluid hardens on contact with air; under the microscope, it appears as a thread of two strands. This thread is sometimes 1,000 yards long; more often, the length does not greatly exceed 500 yards. If left undisturbed, the pupa will hatch in two or three weeks, boring its way through the shell and emerging as a small, white moth. In cocoons from which silk is to be drawn, the insect is killed before it attacks its silky sheath. This is accomplished by placing the chrysalis in a hot oven, exposing it under glass to the rays of the sun or subjecting it to a steam bath.

The cultivation of the silkworm dates in China from a most ancient period; according to Chinese authorities, it was begun as early as 2600 B.C. China is still the chief source of the world's supply of silk fiber, but growing the silkworm is now an important industry in Japan, Italy, Anatolia, Syria, France and Spain. In the United States, the manufacture of silk has been vastly more important than the production of the raw material. Silkworms were introduced into the colonies early in the eighteenth century and cultivated rather extensively. Disastrous speculative activity, together with a blight suffered by the mulberry trees in 1844, dealt the industry a blow from which it has not recovered.

**Process of Manufacture.** To facilitate the removal of the filament, the cocoon is steeped in warm water, which softens the gum and frees the thread. The double strand spun by the silkworm not being tenacious enough for commercial purposes, several filaments are run together through metal or porcelain guides, or eyes, and these adhere to form a single thread. From the guides, the silk is wound upon reels from sixty to ninety inches in diameter, and this is the so-called "raw silk" delivered to the manufacturer in hanks.

*Throwing.* Silk goes through what is technically known as a *throwing* process in preparation for the loom. It is heated in soapy water for several hours. It is then dried, stretched upon reels and wound upon bobbins, dirt being removed and any imperfections in the thread noted in the process. This thread, known as "singles," is frequently used for warp in weaving light fabrics. Singles are reeled into large hanks, and these hanks are bound into bundles called "books." In this form a great part of the Asiatic silk reaches America and Europe.

*Doubling.* Doubling is accomplished by twisting two or more threads together on a bobbin. The resulting silk, known as tram silk, forms the woof in weaving. Organzine, which is used for the warp of heavier fabrics, is made by twisting two or more single threads separately in the same direction and then doubling and retwisting them in the opposite direction.

*Scouring and Dyeing.* When silk emerges from the throwing machine, it has still too much of the natural gum adhering to the strands. This is removed by boiling in a solution of hot soap. In addition to removing the superfluous gum, scouring prepares the silk to take the most brilliant hues in dyeing. In the process, however, it loses from twenty-five to thirty per cent of its weight, and this loss has resulted in the use of still another process, known as loading. Certain chemicals enable the silk to hold more coloring matter, so that it has been found possible to load black silk up to 900 per cent of its weight. Commonly the loading is, of course, much less than this. Loading is defended by manufacturers, but it undoubtedly lessens the durability of the silk.

**Waste.** The waste in silk is very considerable. This results from the fact that only about seven-tenths of the filament can be unwound from the cocoon. This waste, together with the coarser flossy covering of the cocoon and the silk taken from cocoons from which the insect has been allowed to escape, is now treated much like wool. Impurities are re-

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SILKWORMS AND COCOONS.

At left: A basketful of worms gorging themselves on mulberry leaves. At right: Cocoons hatching. Both photographs were taken on Mount Lebanon, in Syria.

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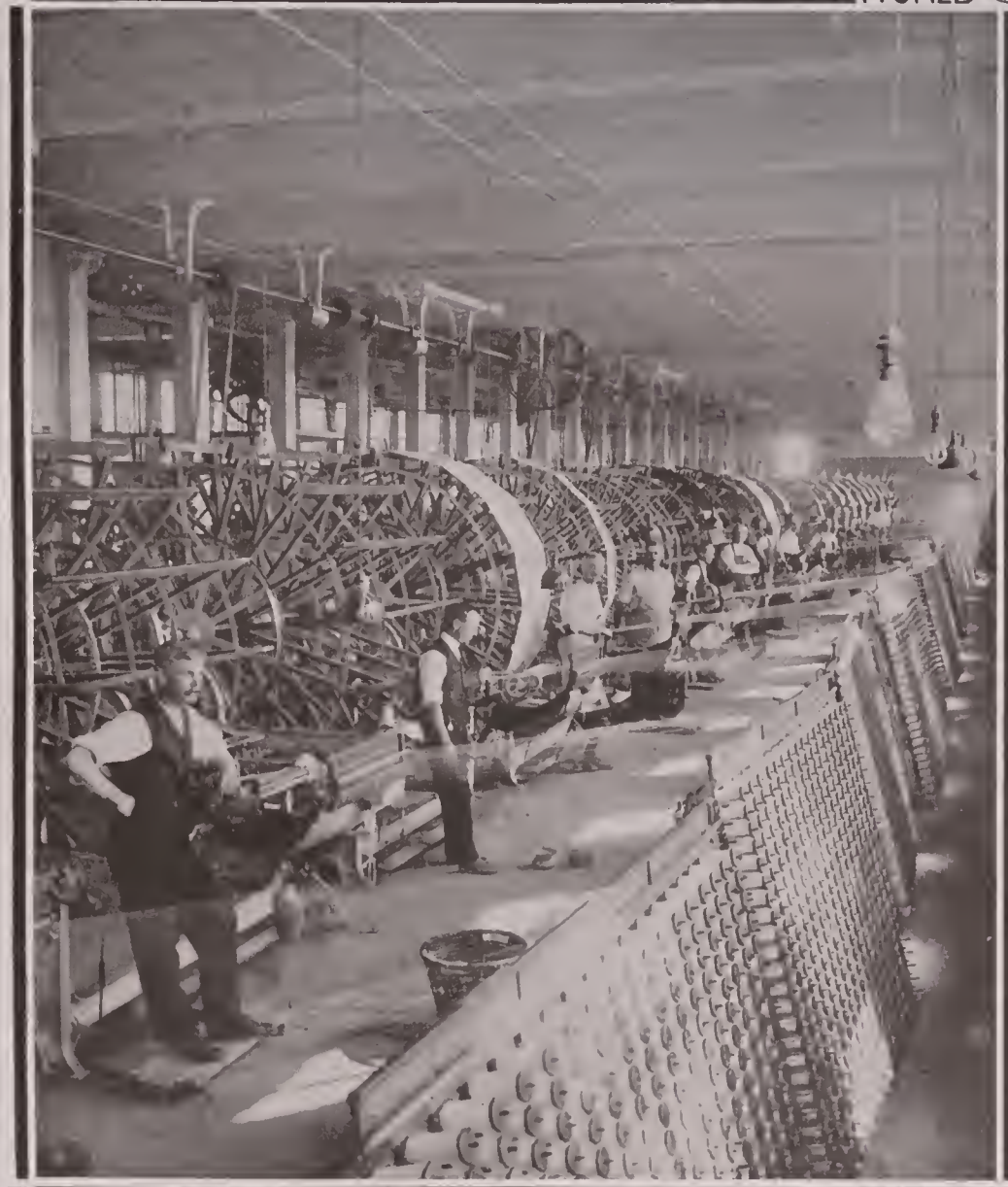
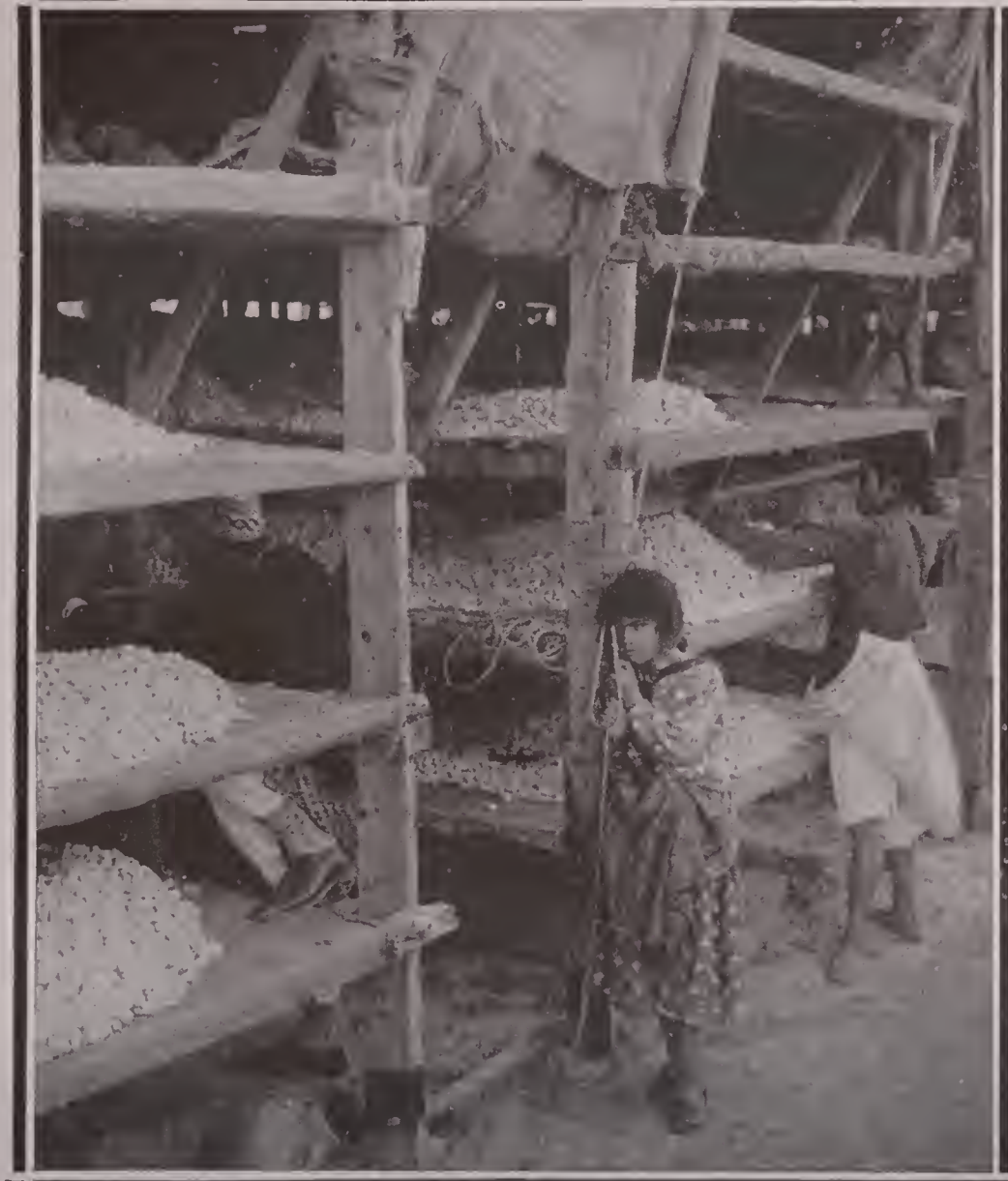
IN AN AMERICAN SILK MILL.

At left: Plain silk weaving, a process requiring skill and patience. At right: Fancy weaving, called Jacquard weaving, from the name of the loom.



AMERICAN SILK MILL.

At left: Warping view in Paterson, N. J., mill.
At right: Winding room of the same mill.



**SILK CULTURE.** At left: Drying of cocoons; they are turned every day to prevent decomposition of the insects inside them. At right: Inferior cocoons are not exported, but are used at home in silk making, with primitive machinery. Both pictures are from Syria.

moved by combing, and the straightened fibers are run together until thread is formed. This is the spun silk of commerce, which is used in making silk yarns and for woof in certain fabrics.

**Weaving.** Silk is woven on looms similar to those used for cotton and wool. Power looms have now supplanted hand looms very largely, but in China, where cheap labor prevails, weaving is still a hand craft. In the manufacturing of silk fabrics, France and the United States take the lead. The first silk mill was set up at Mansfield, Conn., in 1810. Power looms appeared about 1838, and the weaving of silk fabrics spread throughout the Eastern states. Of late years the growth has been exceedingly rapid, the manufacture of finished products ranking now among the country's great industries. In the United States there are 660 establishments producing finished silk products, employing nearly 90,000 persons. The capital invested is about $140,000,000, and the value of the product is $185,000,000 yearly. The industry is concentrated in the East, the leading states being New Jersey, Pennsylvania, New York, Connecticut and Massachusetts. The manufacture of sewing silk is an important branch of the industry in the United States. The process of manufacture consists in doubling and twisting the filaments together until a thread of the desired size and strength is produced. China furnishes an average of 20,000,000 pounds of raw silk and 15,500,000 pounds of waste silk to foreign manufacturers yearly. The exports from Japan amount to nearly 30,000,000 pounds a year.

**Artificial Silk.** The great commercial value of silk has naturally led to many attempts to place a substitute on the market. Cotton and the pulp of soft woods have been experimented with. Cotton is carded and steeped in a mixture of fifteen parts of nitric acid to eighty-five parts of sulphuric acid until its color is clear blue. It is then washed and dissolved in a mixture of ether and alcohol, forming collodion. The collodion is then fed between rollers, which squeeze the liquid through small tubes into nitric acid diluted with water. The resulting fibers are wound upon reels, washed, twisted, spun and dyed. The process for wood fiber is similar. Though the cost of manufacture is considerably less than that of natural silk, artificial silk has not been extensively used. G.B.D.

Consult Posselt's *Structure of Fibres, Yarns and Fabrics.*

## *A Booklet on Silk*

Use two sheets of paper 9 x 12 inches, or larger, and fold once, making eight pages.

Cover page—*Story of Silk* in center; name of school and pupil's name at bottom.
Illustrations: Border of conventionalized mulberry leaves (see page 3996); several moths in flight.

Inside cover—Blank.

Page three—Essay, *The Moth and Its Eggs.*
Illustration: Spray of mulberry leaves with moth and eggs on leaves.

Page four—Essay, *The Worm and Its Cocoon.*
Illustrations: Worms feeding on leaves; a group of cocoons.

Page five—Essay, *The Making of Raw Silk* (killing of grubs, loosening and winding of fiber).
Illustration: Hanks of raw silk.

Page six—Essay, *Silk Weaving.*
Illustration: Machine with silk wound upon it.

Page seven—A page of original designs for silks, done in colors; show stripes, plaids and figured patterns.

Page eight—List of articles made from silk.
Illustrations: Articles made from silk, as ribbons, gloves, stockings, neckties, etc.

**Related Subjects.** The reader may consult the following articles in these volumes:

Adulteration of Foodstuffs and Clothing
Cocoon
Moth
Mulberry
Weaving

**SILKWORM.** See SILK, subhead *The Silkworm.*

**SILK'WORM GUT,** a substance made from fiber drawn from a silkworm which was killed at the time it was ready to spin. The thread, after going through several interesting processes, is used to form the hook end of a fish-line. It is first soaked in cold water and then in a caustic solution. The outside covering is then taken off and the thread is dried, and, if desired, bleached white. A pound of gut can be made from about 25,000 threads. Silkworm gut is valued because it is strong and is invisible in water.

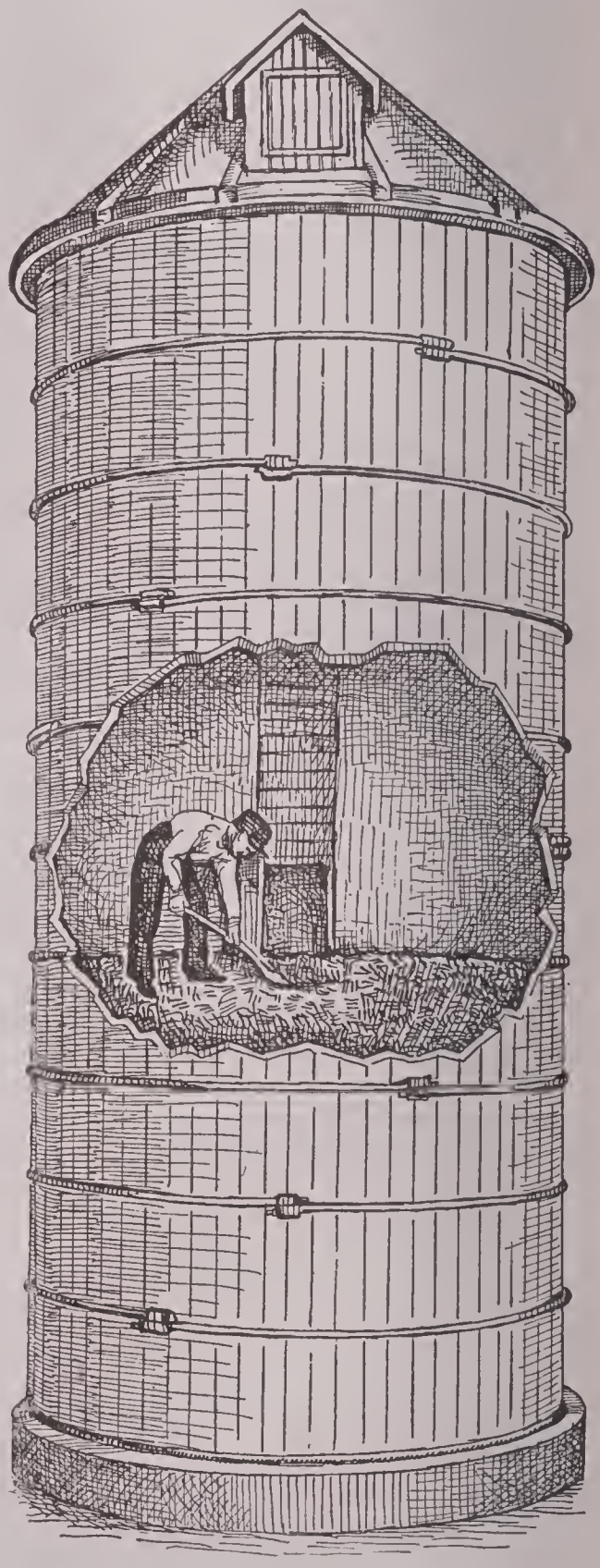
**SI'LO AND SILAGE,** *si'layj.* The word *silo* is applied to a structure in which green crops

are stored for winter feed for farm stock. *Silage* is the term by which the feed is known. The storing of silage is of recent origin in America, having been introduced from Europe in 1875. Few well-equipped farms are now without one or more silos.

**How to Make a Silo.** The first silos used in America were merely pits dug in the ground and covered with boards when full. These were abandoned for square wooden buildings, which were also found unsatisfactory, as the angles prevented the proper filling of the space and the exclusion of air. Next came the circular silo, which is now universally adopted as the most convenient for filling and the best for storage purposes. The silo may be of wood, brick, stone or concrete, the last-named material being the most satisfactory.

Whatever the material used, care must be taken to make the walls air-tight, as on this depends the quality of the silage. Concrete walls are usually built six inches thick at the bottom, tapering to four inches at the top. For wooden silos, southern cypress is the best material to be obtained. The cost of this wood is high in some localities, however, and it may be replaced by white pine or hemlock, which are cheap and durable. A silo is generally built with a conical roof and may be so constructed that it becomes an ornament to the farm. The silage may be put in and removed through a door at the top or it may be put in at the top and taken out through doors built into the sides. Some silos are equipped with ventilators which carry off the gases rising from the silage. This is not at all necessary, and the ventilators merely cause extra expense. A silo should always be circular and never less than six feet in diameter. A serviceable size is ten feet in diameter and twenty-five or thirty feet high. The diameter may be increased, but the height should remain about the same.

**Silage or Ensilage.** The chief food plants used for silage are corn, clover, oats, rye, sorghum, alfalfa, cow peas and beans. The most desirable of these is corn. The crop should be cut before the moisture in the plants commences to dry. The silage must be placed evenly in the silos, carefully spread in layers, and pressed down. One cubic foot of properly packed silage will weigh about forty pounds. As silage does not constitute the sole winter food, forty pounds will be quite sufficient for a cow's daily ration, so the amount of silage to be stored can be readily calculated on that basis. One ton of silage will feed a cow for fifty days. A herd of twenty cows fed on silage for 150 days will therefore require sixty tons of silage. An allowance of about ten per cent should be made for waste, so that sixty-six tons should be stored to produce sixty tons of food. In removing silage from the top, care



AN ORDINARY SILO
The opening shows something of the interior appearance.

should be taken that it is reduced evenly in layers and not taken more from one side than another. The top layer is of course most liable to spoil, especially if it is allowed to become uneven.

Silage has proved such a great benefit to farmers that it now forms the chief winter food for farm and dairy stock. Certain chemical changes take place during storage, but the food value of silage is about the same as that of the green crop. Dairy cattle, especially, thrive on silage, as it is juicy, nutritious and a good milk producer. Three tons of good mixed silage are equal in food value to one ton of good timothy and clover hay, but it must be remembered that one acre of land planted to corn will produce silage equal to four tons of hay. The cost of growing and storing silage varies, but may be reckoned as averaging between $1.75 and $2.50 per ton.

There have been many arguments in agricultural circles concerning the packing of silage. Some authorities maintain that the corn or other crops should be packed whole; others claim that it should be cut. It is now generally admitted that when cut into short lengths, the silage packs better, undergoes less fermentation and is better preserved than when stored whole. F.ST.A.

Consult Rabild, Risser and Parks' "Homemade Silos," in *Farmers' Bulletin No. 589,* United States Department of Agriculture.

**SILURIAN,** *si lu'ri an,* **PERIOD,** that division of geologic time in the Paleozoic Era extending from the Ordovician Period to the Devonian. It takes its name from the Silures, a people of ancient Britain, where the rocks were first studied. The rock formations were very extensive, and they are found in all the continents. They were chiefly limestones and sandstones. In the United States and Canada the Niagara, Helderberg, Salina and Onondaga are some of the most important systems. The great salt beds of New York and Michigan were formed during this period, as were the deposits of gypsum and the iron ore of the Appalachian region. The greater part of the Appalachian Mountains was thrown up and the Delaware Water Gap was formed. Life, so far as known, consisted chiefly of shellfish and starfish forms, corals and sea lilies (crinoids), and fish were beginning to appear.

**Related Subjects.** The reader is referred to the following articles in these volumes:

Devonian Period — Ordovician Period
Geology, page 2439 — Paleozoic Era

**SIL'VER,** a precious metal used from early times for ornamental purposes, utensils, money and jewelry. It is much less valuable than gold among the metals. Silver has a beautiful luster and a whitish color that is referred to in descriptions of the sea and clouds. It was known to the ancient Hebrews by a term meaning *pale,* and the name assigned to it by the ancient Greeks signifies *shining.* Its chemical symbol, *Ag,* is derived from the Latin word for *silver,* or *argentum.*

**Properties.** Although harder than gold, silver is softer than copper. It is malleable, for it can be beaten into sheets one one-hundred-thousandth of an inch in thickness, or thin enough to transmit light. It is ductile, as it can be drawn into wire finer than human hair. It is second only to gold as a conductor of heat and is surpassed by no metal as a conductor of electricity.

Silver melts at about 1728° F., and when molten has the power of absorbing twenty times its volume of oxygen. Upon solidification the oxygen is given up, but if the metal cools rapidly and a crust is formed before the

COUNTRIES LEADING IN PRODUCTION
Four countries produce each over fifteen million ounces of silver each year.

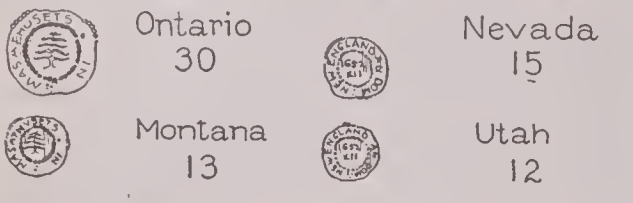
air has escaped, bubbles of gas are formed in the metal and burst through the crust, driving out small ball-like masses of silver. This action, occurring only in pure silver, is known as "spitting," and may be prevented by adding a small amount of bismuth, copper, zinc, salt or powdered charcoal. Silver is not affected by moisture or dryness, alkalies or vegetable acids, but sulphur or sulphureted air blackens it, and thus it quickly tarnishes in rooms lighted by coal gas. Its noncorrosive properties make it valuable for surgical uses.

**Alloys and Compounds.** As silver is too soft to stand constant wear without any hardening element, for commercial purposes it is generally mixed with copper to form what is called an *alloy.* Such an alloy is used in making coins, jewelry and tableware. The United States sil-

ver coins contain 900 parts of silver to 100 parts of copper, while the British have 925 parts of silver to seventy-five of copper. Sterling silver, so popular for jewelry and tableware, is of the same quality as the British coin.

The most important compound is a white solid called *silver nitrate* or *lunar caustic.* It is produced by dissolving silver in nitric acid, and is employed extensively in photography, silver plating and in making indelible ink. *Silver chloride,* another compound, is made by adding hydrochloric acid to a solution of a silver compound. It, too, is used in photography.

**Sources.** Mexico, Ontario, Nevada, Montana, Utah, Arizona, Norway, South America and Australia are the chief sections from which native silver is obtained. The most important ores are the sulphides, that is, those containing




LEADING STATES AND PROVINCES

There are four which produce more than ten million ounces of silver each in average years.

sulphur. The richest ore, found in several parts of the United States, is *argentite,* a simple sulphide in which the proportion of silver is indicated by the atomic symbol $Ag_2S$. The other sulphides, found chiefly in Mexico, Peru, Bolivia, Chili and Idaho, are complex. They include *light ruby silver* (arsenic, sulphur and silver), *dark ruby silver* (antimony, sulphur and silver) and *brittle silver* (same combining elements as dark ruby). Other important ores are *horn silver,* containing chlorine and silver, and *hessite,* a combination of silver and tellurium. Galena, the chief ore from which lead is extracted, often carries silver, and in the Coeur d'Alene district of Idaho there is a valuable mine worked both for lead and silver. In the Butte (Mont.) district silver occurs in the copper ores, and this is also true of the copper ores of a famous mine in Mansfeld, Germany. In Europe, however, the larger part of the silver is obtained from galena ores. There are various silver alloys, including those containing gold, mercury and copper. Gold found in California contains on an average twelve per cent of silver. For methods of extraction, see METALLURGY.

**Production.** The richest silver mines on the globe are in the two American continents. Mexico and the United States alone produce nearly three-fourths of the world's supply of that metal. Canada is also an important producer of silver, the value of its annual output averaging $19,000,000 (see CANADA, subhead *Silver and Lead,* page 1108). In the United States Nevada holds first rank (see NEVADA, subhead *Minerals*). In Europe the richest mines are in Spain, Austria-Hungary, Germany and Norway, with Germany usually ranking first in amount produced. Silver ore has also been found in large quantities in Australia (see AUSTRALIA, subhead *Mineral Resources*). E.B.P.

Consult Clennell's *The Cyanide Handbook;* Crane's *Gold and Silver.*

**Related Subjects.** In addition to references above the attention of the reader is directed to the following articles:

| | |
|---|---|
| Alloy | Metals |
| Lunar Caustic | Photography |

**SIMCOE,** *sim'ko,* a town in Ontario, the county town of Norfolk County. It is in the southern part of Ontario, and is forty-six miles southwest of Hamilton and seventy-three miles southwest of Toronto. Port Dover, an important port on Lake Erie, is seven miles from Simcoe. Simcoe is served by the Grand Trunk, Wabash, and Lake Erie & Northern Electric railways. It lies in the heart of one of the richest agricultural sections in Ontario, and one of its chief industries is the canning of fruits and vegetables. It has the largest exclusive lithographing plant in Canada. There are also a large woolen mill and other smaller factories. Simcoe owns its water works (since 1906), sewerage system (1913) and hydroelectric plant (1914). Its Carnegie Library was erected in 1912. Simcoe was founded early in the nineteenth century, and was incorporated in 1851. It was named for John Graves Simcoe (which see). Population in 1911, 3,227; in 1916, estimated, 4,160.

**SIMCOE,** JOHN GRAVES (1752-1806), a British general and colonial administrator, first governor of Upper Canada. Simcoe was born at Northamptonshire, England. After receiving his education at Eton and Merton College, Oxford, he entered the army in 1771. He served throughout the Revolutionary War in America, was wounded at Brandywine and Monmouth, and with Cornwallis surrendered at Yorktown in 1781. From 1791 to 1796 he was the first governor of Upper Canada. As governor he made every effort to induce the immigration of those Americans who were loyal to Great Britain but had been unable to

face the hardships of the earlier Loyalists who had settled in Canada. He was a man of great energy, and personally supervised the building of roads and bridges. Simcoe, too, was largely responsible for the removal of the capital from Newark to Toronto, and he camped in a tent on the site of the future city until better quarters could be provided. Lake Simcoe and the town and county of Simcoe in Ontario were named in his honor.

JOHN GRAVES SIMCOE

After leaving Canada in 1796, Simcoe was governor of Santo Domingo for nearly two years. In 1806 he was appointed commander-in-chief in India, but returned home almost at once on account of illness and died in England. He was created lieutenant-general in 1798.

Consult Scott's *John Graves Simcoe.*

**SIMCOE,** Lake, a small lake in Ontario about midway between Georgian Bay and Lake Ontario. It has an area of 271 square miles, a length of thirty miles and a maximum width of eighteen miles. Its surface is about 130 feet above Georgian Bay, into which its surplus waters flow through Lake Couchiching and the Severn River. Lake Simcoe is a delightful summer resort, and its many pretty islands and densely-wooded shores are studded with cottages and villas. During the winter the lake freezes over sufficiently to provide a thoroughfare and also to supply Toronto and other nearby cities with a large part of their summer's supply of ice. Barrie and Orillia are the principal towns on its banks.

Lake Simcoe is of considerable historic interest. In the days of the coureurs-de-bois it was on the main route from the east to Lake Huron and Fort Mackinac. This route began with a long portage from the site of Toronto, on Lake Erie, to Lake Simcoe. After crossing Lake Simcoe the trappers again portaged to the Nottawasaga River, and down the river to Georgian Bay. This region was the scene of the great war in which the Iroquois practically exterminated the Huron Indians. The lake was named for John Graves Simcoe (which see).

**SIMILE,** *sim'i lee,* a figure of speech in which some resemblance between two objects essentially different is pointed out by means of some definite word, as *like* or *as.* It is this explicit statement of the comparison which distinguishes it from the metaphor. Such commonly used expressions as "She ran like a deer," "It was as sudden as lightning" are similes, but all figures of this class are not so simple. The so-called *Homeric* simile is a long, involved comparison, worked out beyond the point where real resemblance ceases.

Often similes become so much a part of everyday speech and thought that the specific word of comparison, *like* or *as,* is dropped, and the figure becomes a metaphor. Thus, when a crafty, cunning man was first described in the words "He is like a fox," the figure was doubtless striking; but the resemblance has come to be taken so completely for granted that the metaphor, "He is a fox," is much the more natural expression to use. See Figure of Speech.

**SIM'LA,** the capital of the district of Simla, in the province of the Punjab, India, and the summer capital of British India. Because of its situation on a spur of the Himalaya Mountains, 7,000 feet above sea level, and its cool, healthful climate, a great number of Europeans from all parts of India make it their temporary residence during the hot season. The viceroy of India and his assistants retire from the capital to Simla early in the summer, and several government officials have established permanent headquarters there. In the place there are many picturesque villas, churches, institutions, schools, hotels, clubs and banks. The town is about 170 miles north of Delhi, and since 1903 has had connection with the Peninsular railway system. Permanent population, about 15,000; summer population, about 35,000. See Punjab.

**SIMMS,** William Gilmore (1806-1870), an American novelist and poet, with the exception of Edgar Allan Poe the most brilliant man of letters produced by the South before the War of Secession. For spirited narrative, vivid description and faithful portrayal of local conditions, nothing excels his border romances of the Southwest—*Guy Rivers, Border Beagles* and *Beauchampe;* his story of Indian warfare in the early days of the Carolinas—*Yemassee;* or his tales of the Revolutionary War—*Mellichampe, The Scout, Woodcraft* and others. In these romances he shows himself a disciple of Cooper. He was also a successful writer of short stories, the best of which may be found in the two volumes published under the title *The Wigwam and the Cabin.* A history of

South Carolina and several biographies of well-known Southern men are included in the list of his prose writings. As a war poet Simms is still held in affectionate remembrance by his countrymen in the South, and he has written several poems of enduring value. Among the best known of these are *Atalantis, a Story of the Sea, The Swamp Fox* and *The Lost Pleiad.* The latter is probably his finest achievement in verse, and its closing lines are often quoted:

The hope most precious is the soonest lost,
The flower most sweet is first to feel the frost.
Are not all short-lived things the loveliest?
And, like the pale star, shooting down the sky,
Look they not ever brightest, as they fly
From the lone sphere they blest?

Simms was born in Charleston, S. C., also the birthplace of a contemporary poet, Henry Timrod. He was educated for the profession of law, and was admitted to the bar in 1827, but never practiced to any extent. His first volumes of poems were published the same year, and the following year he became owner and editor of the *Charleston City Gazette.* Thereafter he devoted himself entirely to journalism and literature. He supported the cause of the South earnestly and lost the greater part of his fortune during the war. An excellent biography of Simms, by W. P. Trent, has been included in the *American Men of Letters Series.*

**SIMONIDES,** *si mon' i deez* (556-468 B. C.), a celebrated Greek lyric poet and one of the most accomplished men of antiquity. He excelled in his triumphal odes and elegies. These are characterized by a sweetness, simplicity, pathos and power of expression which rank him with Pindar, his contemporary and great rival, whom Simonides scandalized because he accepted pay for his writings. See PINDAR.

The young poet was treated with great consideration by Hipparchus. Later he enjoyed the patronage of powerful families of Thessaly. After the invasion of Greece by the Persians he wrote a number of elegies, dirges and epigrams celebrating the heroes and the battles of that struggle; for his elegy on the soldiers who fell at Marathon he won the prize over Aeschylus. He won fifty-five other prizes in similar poetical contests. His last years were spent at the court of Hiero of Syracuse.

**SIMOOM',** a hot, dry, destructive wind common to the Sahara and Arabian deserts, which carries with it great clouds of dust, so that the whole sky becomes hazy. It is one of the terrors of the desert, arriving suddenly and suffocating men and beasts. Travelers have to lie down close to the ground with their heads covered, and the camels burrow their noses into the sand. The simoom may pass in ten minutes or it may last for hours, even for days, leaving the sand drifted like snow after a blizzard. In March, 1901, there was a great African simoom which scattered red and yellow sand and dust over all of Southern Europe, and it was even reported that sand fell in England. This wind is caused by the overheating of the soil and layers of air next to it. The burning hot air ascends and cooler currents from all sides flow in, producing a desert whirlwind.

**Related Subjects.** The reader is referred to the article WIND and to the titles there listed.

**SIM'PLON,** a pass in the Swiss Alps over which Napoleon built a magnificent road in 1800-1806. The construction of this highway is considered one of the great feats of modern engineering; it is forty-two miles long and between twenty and thirty feet wide, and is carried over 611 bridges. In other places it runs through huge tunnels. The pass lies near the frontier of Piedmont, Italy, in the eastern part of the canton of Valais. The name is also applied to the largest railway tunnel in the world, built through the Alps at this point between Brieg and Isella. It consists of two single-track bores nearly twelve and one-half miles in length, and was completed in 1906, eight years after work was begun. The pass is 6,592 feet above sea level; the highest point of the railway tunnel, about 2,300 feet.

**SIMP'SON,** SIR GEORGE (1792-1860), a Canadian explorer and administrator, for thirty-five years governor of Rupert's Land and general superintendent in America for the Hudson's Bay Company. Simpson was a native of Ross-shire, Scotland, and was sent to America in 1820 by the Earl of Selkirk, then the guiding spirit of the Hudson's Bay Company. After the union of the Northwest and Hudson's Bay companies, in 1821, Simpson was appointed governor of the northern department and in the same year governor of all Rupert's Land. Physically a small man, Simpson yet had boundless energy, and he had, in the words of a contemporary, "the self-possession of an emperor." Every year he made the overland journey from Montreal to the far West, on several of his investigation trips crossing the Rocky Mountains.

Under his aggressive administration the country between the Pacific Ocean and the Rockies was occupied, and to his enterprise Canada is chiefly indebted for its control of the Pacific

coast. He sent out numerous exploring expeditions, and himself led several. He was knighted in 1841, and in the same year started on a journey around the world, which he described in *A Narrative of a Journey Round the World in the Years 1841 and 1842.*

**SIMPSON,** Sir James Young (1811-1870), a distinguished Scotch physician, the discoverer of the anesthetic qualities of chloroform. He was born at Bathgate and educated at the University of Edinburgh, from which he received the M. D. degree in 1832. In 1840 he became professor of medicine and midwifery in the university, and seven years later was appointed physician to the queen of England. In that same year he announced his important discovery, and his advocacy of the use of chloroform in childbirth gave rise to heated and widespread discussion. Simpson was also the inventor of a means of arresting loss of blood in hemorrhage. For his great service to his profession he received various honors and in 1866 was created a baronet. He was given a public funeral, and a maternity hospital was founded in Edinburgh in his honor. See Anesthetic; Chloroform.

**SIMS,** William Sowden (1858- ), an American vice-admiral who commanded the American naval forces in European waters after the United States joined the allies in the War of the Nations. He was born at Port Hope, Canada, but was educated in the United States. He entered the Naval Academy at Annapolis, was graduated in 1880, and then rose steadily in the service, attaining the rank of vice-admiral in 1917. From 1897 to 1900 he was naval attaché to the American embassies at Paris and Petrograd (Saint Petersburg), after which he was appointed fleet intelligence officer and inspector of target practice for the Asiatic squadron. In this capacity he reported to President Roosevelt a new system of target practice for the navy gunners. The President ordered him home and had the system adopted, and between 1902 and 1909 Sims was inspector of target practice at the Bureau of Navigation. He was thus instrumental in vastly improving American gunnery practice.

VICE-ADMIRAL SIMS
The foremost American naval commander in the War of the Nations.

Between 1909 and 1911 he was commander of the *Minnesota,* for the next two years was a member of the Naval War College, and in 1913 was appointed to the command of the Atlantic torpedo flotilla. The entrance of America into the European war brought further responsibilities. His promotion to the rank of vice-admiral, ordered by President Wilson in 1917, gave him an equal standing with the British and French naval commanders, and during an interval in which the commanding British officer on the coast of Ireland was absent Admiral Sims held chief command of the allied fleet in the Irish Sea.

**SINAI,** *si'ni',* or *si'na i,* the mountain, called also in Scripture *Horeb,* on which Moses received the law. It is supposed to be one of the three peaks of the mountain range on the peninsula of Sinai, which lies between the two arms of the Red Sea—the gulfs of Suez and Akabah. The Children of Israel camped on the plain before Sinai while Moses remained forty days upon the Mount; at the end of this period he returned with the Ten Commandments written on tables of stone. *Sinai* is often used figuratively in literature to symbolize the legal side of God's dealing with men, as *Olivet* and *Galilee* represent the milder aspects of forgiveness and grace.

**SINCLAIR,** Upton [Beall] (1878- ), an American writer and prominent advocate of socialism, was born at Baltimore, Md. He was graduated from the College of the City of New York in 1897, then spent four years in postgraduate work at Columbia University. Sinclair became widely known in 1906 as the author of a novel called *The Jungle,* which exposed conditions then existing in the Chicago stockyards. As the result of his agitation an investigation was ordered by President Roosevelt, and improvement followed. Sinclair is an advocate of coöperative housekeeping, and he founded a colony on that basis in 1906, near Englewood, N. J. As the building burned down in 1907, the experiment could not be fully worked out. He also was one of the founders of the Intercollegiate Socialist Society. In 1917 he withdrew from the Socialist party because of the opposition of that party to American participation in the War of the Nations. His writings include *Springtime and Harvest, The Money-Changers, Sylvia, The*

*Cry for Justice* and *King Coal, a Novel of the Colorado Strike.*

**SIN'DIA,** the family name of the Mahratta dynasty, the rulers of Gwalior, a native state of Central India, until conquered by the English in 1844. They were first known to fame in the early part of the eighteenth century, when Ranoji Sindia, who had risen from the position of a slipper carrier to the peshwa (prince), was made the commander of the royal bodyguard. When he was sent to collect tribute from the people of the Malwa district, Sindia established headquarters there and built up his own dominions, where, after his death in 1754, his descendants continued to reign until the occupation of the country by England.

The most powerful of these successors was Madaji Sindia, who, in 1781, executed a treaty with Great Britain by which he secured European discipline and tactics for his army. Thus equipped beyond the dreams of other native princes, he subjugated Delhi and Agra and forced the emperor to a secondary position, Sindia himself acting in supreme capacity in every important matter.

**SIND'ING,** CHRISTIAN (1856- ), a prominent Norwegian composer and teacher. His compositions are interesting because they suggest the spirit of Northern lands and have charm of melody and excellence of construction. At the Leipzig Conservatory, where Sinding studied, he won high honors as a pianist and organist. His principal works include a symphony in D minor, the *Rondo Infinito* for orchestra, the suite *Episodes Chevalaresque,* the piano concerto in D flat, and the violin concerto, op. 45. In 1910 his opera *Der heilige Berg* was produced in Berlin.

**SINGAPORE,** *sing ga pohr',* one of the parts of the Straits Settlements, an island and city which is an Asiatic colony of Great Britain (for location see colored map, opposite page 417). The island is about twenty-seven miles long and fourteen miles wide, and lies off the southern end of the Malay Peninsula, from which it is separated by a strait less than a mile in width. Its area is 217 square miles, and in 1913 it had an estimated population of 330,042 (including dependencies), most of whom live in the city of Singapore, capital of the Straits Settlements. Christmas Island, the Keeling Islands and Labuan Island are dependencies of Singapore.

The city of Singapore is the most important commercial emporium of Southeastern Asia. It is a free port and has a large, convenient harbor, with miles of wharves, quays and docks. Many oceanic routes meet at this port of call. Singapore is a well-fortified, picturesque city, with a beautiful esplanada on the outer harbor, and numerous handsome buildings, cathedrals and museums. It has one of the finest botanical gardens in the world, and branches of the Royal Asiatic and other learned societies. Despite its nearness to the equator (ninety miles), the climate is agreeable and healthful. Cocoanut oil, spices, teak-wood and hides, sago, tapioca, sugar, tortoise shell, mother-of-pearl, India rubber, coffee and tobacco are important exports. See STRAITS SETTLEMENTS.

**SING'ING.** Musical tones are produced by the same mechanism as speaking tones; that is, the vocal cords are set in vibration by a current of air from the lungs, and these vibrations produce sound. In singing, however, one uses many more notes than in talking. In the production of singing tones the cords undergo considerable tension, or stretching, and the higher one sings the more tightly the cords are stretched, just as the higher notes on a violin are produced by the tightly-stretched strings. Pitch is also determined by the length of the vocal cords. Women have shorter cords than men and their voices are higher pitched, as the shorter the cord the higher the pitch. A very long cord gives a deep bass voice, the lowest division of the singing voice. The other divisions, named in order from low to high, are barytone, tenor, alto and soprano. The compass of the average singing voice is twelve tones, but that of trained singers varies from two to three octaves or more. As the ability to sing well is based on proper breathing, singing lessons are sometimes a means of building up the bodily health.

Consult Marchesi's *Ten Singing Lessons;* Henderson's *Art of the Singers;* Mills' *Voice Production in Singing and Speaking.*

**Related Subjects.** In connection with this discussion of singing the reader should consult the following articles in these volumes:

Music
Sound, subhead *High Tones and Low*
Voice, subhead *How to Cultivate the Voice*

**SINGLE,** *sing'g'l,* **TAX,** a method of taxation which would raise all the revenues needed by the government by a single tax on land. As generally used, the term designates the plan formulated by Henry George, an American journalist and economist. George did not originate the doctrine; he did, however, give it its simplest and most lucid expression.

**Theory of the Single Tax.** The argument developed by George in his book, *Progress and Poverty,* is that the land belongs by right to all the people, and no generation has the right to alienate permanently any portion of it. In studying economic progress, he arrived at the conclusion that it is marked by increasing extremes of wealth and poverty. This is a result of the tendency of a small part of the community to obtain possession of the land, which is the great natural source of wealth. As long as free land is obtainable, the laborer continues to command a good living wage; but when no such land is obtainable, he is compelled to pay a price for the use of land, and consequently he no longer retains all the wealth he produces by his labor. A considerable portion of it goes to the landlord in the form of rent (which see). Rent, according to the single-tax theory, tends to absorb all values above the minimum wages and interest; this is manifestly unjust and socially undesirable. A few square feet of rocky soil on the point of Manhattan Island (New York City) are worth a fortune, and this value is created by the presence, within a small area, of over four million people. It is pressure of population that creates excessive land values; consequently it is to be regarded as a social value, and the community as a whole should share it.

Since they regard the private ownership of land as wrong, single-taxers do not hesitate to urge a tax sufficient to absorb practically the whole of the landlord's share. In their scheme of taxation, he would be left only a sufficient reward to induce him to collect the rent and pay his tax. In fixing this tax it would be necessary to discriminate between the actual value of the land and that added by improvements. This actual value, created by nature and population, is known to economists as *pure rent,* and the absorption by society of practically all pure rent is the aim of single tax. This rent would be more than sufficient to defray the expenses of government, and no other form of property would need to be taxed. Such a scheme of taxation would prevent the holding of vacant land for speculative purposes, since taxes so heavy could not be supported by idle land. Thus land which is now waste could be made to add to the total economic output. According to its adherents, the single tax would have the effect of equalizing opportunity in every sphere and would greatly stimulate production. It would largely do away with extreme wealth and poverty.

**Objections to the System.** Critics of the system have pointed out that property is a social product, the right to hold which is granted for purposes of expediency. It is safeguarded by contracts, guaranteed by the state. Any such violent disturbance of the delicately-adjusted economic and social scheme as confiscation implies would work great hardship and injustice on a considerable part of the community. As regards its effect upon industry, it has been urged that to vest real ownership of the land in the government would be to reduce farmers to the status of tenants and to discourage the tendency to improve the land, which is most certainly stimulated by private ownership. A third criticism is to the effect that revenues derived from land alone would be inelastic and ill adjusted to the actual needs of government.

**Progress of Single Tax Movement.** Naturally the single tax can only be the result of a gradual development, step by step. The first step is municipal single tax, which means that the tax on land values is limited by the requirements of local government.

*Municipal single tax* has been introduced in many parts of the world. *Progress and Poverty,* Henry George's great book, was published in 1879, and in 1890, only eleven years later, the legislature of Queensland, Australia, required its municipalities to exempt all personal property and all real estate improvements from taxation. In the next year New Zealand adopted single tax in a modified form by providing a graduated state land tax, and since 1896 about one-half of the local taxing districts have adopted the complete municipal single tax.

In Canada the single tax has made greatest progress in the West, where it has been adopted by nearly all the larger cities, including Vancouver, Victoria and Edmonton. In 1912 all towns, villages and rural municipalities in Alberta were required to raise their local revenues by taxes on land values. In Saskatchewan since 1914 a super-tax of $40 has been levied on each 640 acres of uncultivated land. British Columbia in 1892 required municipalities to assess improvements on land at not more than fifty per cent of actual value, but many of the municipalities have since gone the whole distance and no longer tax any improvements.

In the United States the single tax has not been as extensively adopted, chiefly because most American cities are not free to change

their system of taxation. Canadian cities have a larger degree of home rule than most cities in the United States, but even in the latter country the single tax has been adopted, notably by Pueblo, Colo., Houston, Tex., and Pittsburgh and Scranton, Pa. Pueblo in 1913 voted to exempt practically all property except land values from taxation; in the first year fifty per cent of the assessed value of improvements was stricken from the tax list, and in the second year, ninety-nine per cent. In Pittsburgh and Scranton, twelve years, from 1913 to 1925, were allowed to reduce the assessment on improvements by fifty per cent.

**National Single Tax.** Schemes for a national single tax include such a violent readjustment of existing conditions that even its most earnest advocates do not indulge hope. Under such a system there would be no tariffs, no income taxes, no taxes of any kind except on land. As a preliminary to national single tax there must be universal free trade. The single-taxers believe that universal free trade, like the single tax itself, can be brought about only by incredibly slow movement. Once inaugurated, however, world-wide free trade and single tax, it is claimed, would increase international trade to such proportions that the nations of the world would be bound together into an inseparable brotherhood. The ultimate result of the single tax would be the abolition of war, for mere self-interest would require peace. The most ardent advocates of the single tax believe that it would create a new and higher patriotism in the world. G.B.D.

Consult George's *Progress and Poverty;* Matthews' *Taxation and the Distribution of Wealth.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Economics | Rent |
| George, Henry | Tax |

**SING SING,** one of the largest state prisons in the United States, situated outside the village of Ossining, N. Y., about thirty miles north of New York City. It was erected by convicts, the first draft of whom, men from Auburn state prison, began work on the men's building in May, 1825. A building for women was erected in 1835. The buildings of the prison are antiquated and unsatisfactory, judged by prison methods of the present day, and are not well adapted to the introduction of prison reform. At the same time, under the administration of Thomas Matt Osborne, who was warden from 1914 to 1916, several reforms were inaugurated, and the moral and physical conditions of the prisoners were considerably improved. As a result of Osborne's agitation the New York state legislature passed a bill authorizing the erection of a new and adequate prison to take the place of the old one. See OSSINING.

**SINN FEIN,** *sin fayn,* an Irish society devoted to the single purpose of establishing an "Irish Ireland." It opposes control of the island by Great Britain, and is working for Irish independence. The society took a leading part in the short and unsuccessful revolution which attempted to found an Irish republic in April, 1916. The words *Sinn* and *Fein* are from the Gaelic language, the ancient tongue of Ireland, and mean *Ourselves Alone.* They were first made the name of the newspaper previously called the *United Irishman,* and then became the title of the organization which grew up among the readers of the paper—Irish poets and philosophers who dreamed of a native land as distinctly an individual nation as England itself. The Sinn Fein continued to exist after the suppression of the revolt, the history of which is given in the article IRELAND, and a member of the organization, though he was in prison, was elected to Parliament in 1917.

**SIOUAN,** *soo'an,* **INDIANS,** next to the Algonquian group, the largest linguistic family of North American Indians north of Mexico. The largest tribal group of Siouan Indians is the Sioux, or Dakotas. The principal body formerly ranged along the west bank of the Mississippi, northward from the Arkansas, and nearly to the Rocky Mountains. They also ranged northward for some distance into Canada in the direction of Lake Winnipeg. The eastern tribes lived in wigwams of bark and mat, but the bands on the plains lived in teepees made of earth and skins. The principal tribes of the Siouan family are the Omaha, Sioux, Winnebago, Assiniboin, Osage, Ponca and Quapaw, but there are numerous others. The Sioux, or Dakotas, were the most hostile to the white settlers of any of the Siouan groups. The entire group now numbers about 40,000.

**Related Subjects.** For a description of various Siouan tribes see the following articles in these volumes:

| | |
|---|---|
| Assiniboin | Quapaw |
| Osage | Sioux |
| Ponca | Winnebago |

**SIOUX,** *soo,* or **DAKO'TA,** a large and powerful tribe of North American Indians of Siouan stock, who formerly occupied the region extending from the Arkansas River in the south to the western tributary of Lake Winnipeg in

the north, and west nearly to the Rocky Mountains. In the War of 1812 they aided the British. In 1837 they ceded all their lands east of the Mississippi to the United States, and in 1851 they ceded 35,000,000 acres west of the Mississippi for $3,000,000. The government failed to carry out the provisions of the treaties, and this caused a general uprising of the Sioux in 1862; nearly 1,000 settlers were killed before the Indians were finally subdued. All of the Minnesota Sioux were then removed to Dakota reservations.

Some of the bands settled in the Black Hills, and when gold was discovered there the United States tried to purchase the tract. Sitting Bull, Spotted Tail and Red Cloud visited Washington in 1875, but President Grant was unable to persuade them to sign a treaty. In June, 1876, an exploring expedition under military guard was attacked in the Black Hills, and a severe battle followed in which General Custer and all of his immediate command were killed. After several encounters the Indians were beaten, and later were pardoned and returned to their Dakota reservation. Another outbreak in 1890 was quelled by General Miles.

The Sioux represent the highest type of North American Indians in physical courage and intelligence. Several books and papers printed in their language have been published. They are now settled on various western reservations and number about 22,000. These Indians showed their loyalty in 1917 by enlisting in great numbers in the volunteer army. Their chief, too old to fight, was made a vice-president of the Red Cross Society.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Custer, George Armstrong | Miles, Nelson Appleton |
| Indians, American | Siouan Indians |
| | Sitting Bull |

**SIOUX CITY,** Iowa, the county seat of Woodbury County and the second largest city of the state, ranking next to Des Moines. It is situated on the Missouri River, the western state boundary, at the mouth of the Big Sioux River, 100 miles north of Omaha and 156 miles northwest of Des Moines. The city is served by the Chicago, Burlington & Quincy, the Chicago & North Western, the Chicago, Milwaukee & Saint Paul, the Saint Paul, Minneapolis & Omaha, the Great Northern and the Illinois Central railroads. River boats handle freight between this and other river towns. The population, which was 47,828 in 1910, had increased to 57,178 in 1916 (Federal estimate).

Sioux City has an area of forty-three square miles, which is greater than that of any other Iowa city, and it is built upon low lands and bluffs along the river. The chief features of the city are Stone Park (800 acres), a Federal building erected in 1896 at a cost of $300,000, a $750,000 county courthouse, a Carnegie Library, the Y. M. C. A. building and the Union Depot. Important among the institutions are Morningside College (Methodist Episcopal), Trinity College (Roman Catholic) and a number of hospitals. The leading industrial establishments include railroad shops, stockyards and meat-packing plants, planing mills, brick and tile plants and manufactories of farm implements. There is an extensive wholesale trade.

The place was settled about 1853 and was incorporated in 1856, and a year later it became a city. In 1910 the commission form of government was adopted. During its early years Sioux City was the outfitting place for prospectors going to the Black Hills, and was a government post for expeditions against the Indians. It is named for the native Indian tribe, and contains the grave of War Eagle, a famous Sioux chieftain. W.E.H.

**SIOUX FALLS,** S. D., the county seat of Minnehaha County, and the largest city of the state. In 1910 it had a population of 14,094; this had increased to 16,499 (Federal estimate) in 1916. Among the foreign-born, Scandinavians and Germans predominate. Sioux Falls is situated on the Big Sioux River in the southeast corner of the state, 259 miles north and west of Omaha and 317 miles southwest of Minneapolis. Railroads entering the city are the Chicago & North Western, the Chicago, Milwaukee & Saint Paul, the Chicago, Rock Island & Pacific, the Chicago, Saint Paul, Minneapolis & Omaha, the Great Northern and the Illinois Central.

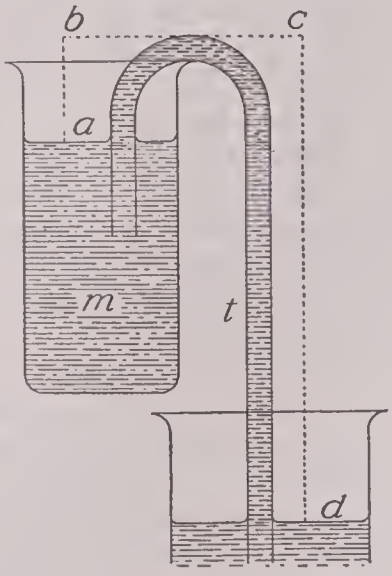
Sioux Falls is built upon rolling prairies and has an agreeable and healthful climate. Many of the public buildings are built of a native pink jasper, giving the city an unusually attractive appearance. Prominent structures are the Federal building, reconstructed in 1913 and valued at $470,000, the fine county courthouse, the Carnegie Library, the Masonic Temple and several churches of real artistic merit. The city contains the Sioux Falls College (Baptist), All Saints School (Episcopal school for girls), the Lutheran Normal, McKennan and Sioux Falls hospitals, the State Children's Home and the state penitentiary. Sherman (35 acres),

Phillips' (21 acres) and McKennan (19 acres) parks and the rapids of the river are among the interesting features of the city.

Sioux Falls is surrounded by a rich farming and stock-raising country, of which it is the commercial center. In the vicinity are large quarries of jasper or granite, used locally and shipped for building purposes. Water power furnished by the river, which drops at this point nearly 100 feet in a half mile, is utilized by manufactories. The leading industrial establishments are meat-packing plants, a biscuit factory, quarries and flour mills.

The first permanent settlement was built about 1857. The place was incorporated as a village in 1877 and became a city in 1883. It adopted the commission form of government in 1909, and owns the water system. L.M.G.

**SIPHON,** *si'fahn,* a bent tube with two unequal arms, used to carry a liquid from a higher to a lower level. In the accompanying figure the liquid (*m*) is forced through the tube (*t*) by the pressure of the air on the surface (*a*), which amounts practically to fifteen pounds to the square inch. As long as the pressure at *a* is greater than the weight of the column of water (*a b*), or until the surfaces (*d a*) are the same level, or *a b* equals *c d,* the flow will continue. Theoretically, a liquid will not flow through a siphon when the highest point in the tube is thirty-three feet above the level of surface *a,* because the pressure of a column thirty-three feet high is equal to the pressure of the atmosphere. In practice, however, the highest point cannot exceed thirty feet, and a much better flow is secured if it is not more than twenty-six feet.

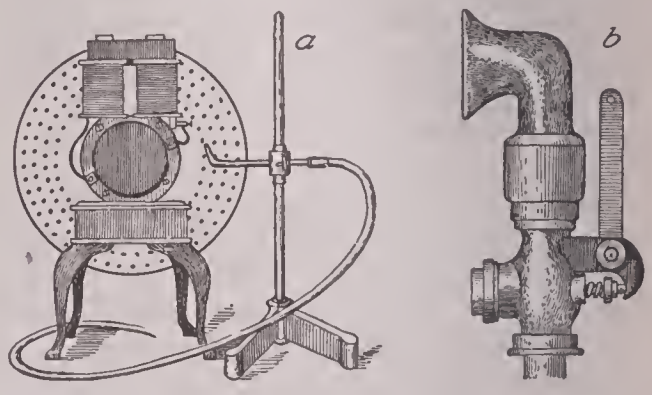



PRINCIPLE OF THE SIPHON

The tube (*t*) is the siphon; explanation of the physical law involved appears in the text.

The principle of the siphon is employed on a large scale in aqueducts for carrying water over hills, but in such cases the flow is increased by the use of pumps. The so-called siphon bottles used in mixing drinks are operated by compressed air or gas.

**SI'REN,** an instrument designed originally to measure the number of vibrations in a musical tone of a given pitch. The original form of siren consists of a circular disk perforated with one or more circular rows of oblique holes, and so mounted that it revolves close to another disk perforated with corresponding holes sloping in the opposite direction. The stationary disk is connected with a bellows or some other device by which compressed air, gas or steam is forced through its holes. When the holes in the revolving disk are opposite those in the stationary disk a puff of air escapes.




TWO OF THE SIRENS

The figures *a* and *b* are referred to in the text.

As the velocity of rotation increases, the puffs become more frequent until a clear, continuous sound is produced. The more rapid the vibration the higher the pitch. For instance, if there were thirty perforations in the disk, and it revolved fifteen times per second, there would be 15 x 30 or 450 puffs or vibrations per second. Thirty revolutions per second would give 900 vibrations, and so on. The revolving disk is connected with a system of clock work which registers the number of vibrations per second, and by use of a siren of this pattern the number required for any pitch can be easily determined (see *a* in the figure). A more recent pattern makes use of two perforated cylinders, one within the other, in place of the disks. The outer cylinder revolves.

Very large sirens are used for fog signals at lighthouse stations. Steam is employed in place of air, and a large trumpet-shaped horn (*b* in figure) is used to direct the sound. Some of these fog horns, as they are called, can be heard twenty-five or thirty miles. They produce low tones that carry a long distance.

**SIRENS,** *si'renz,* THE, in Greek mythology, two maidens who lived on an island and by their exquisite singing enticed mariners to their shore, where they remained, forgetful of home, of friends and of duty until they died of starvation. Ulysses was warned by Circe of the danger

from the Sirens, and he stopped the ears of his companions with wax. He himself wished to hear the music, but he had himself strapped to the mast of his vessel so that he could not yield to the charm if he wished to. See Ulysses.

**SIRIUS,** *seer'i us,* The Dog-Star, the brightest star in the heavens and one of those nearest to the earth. It is still so distant, however, that its light takes more than eight years to reach the earth. A line drawn eastward through Orion's belt points at the dog-star, the head of Canis Major. It is a star of first magnitude, and radiates forty-eight times as much light as the sun. A companion star to Sirius was discovered in 1862, accounting for the apparent motion of Sirius in a small orbit. The companion gives out one ten-thousandth part of the light of Sirius, but has a mass of two-fifths its size.

**SIROCCO,** *si rok'o,* the Italian name given to two distinct types of southeast winds, common to countries bordering the Mediterranean on the north. Both winds are warm because they come from warm regions, but one is a damp wind that usually heralds rain, while the other is dry and laden with dust from the Sahara Desert far to the south. When this type of sirocco blows the sky is dark with fine sand which burns the skin and parches the throat. It is the scourge of Sicily, and is similar to, though less violent than, the simoom (which see) of the desert.

**Related Subjects.** The reader is directed to the article Wind and to the list of related articles there given.

**SISAL,** *se'sahl,* or *si'sal,* also called Grass Hemp, is a tall, tropical plant whose swordlike leaves yield a valuable fiber. The plant is a native of Yucatan, Mexico, and is also cultivated to some extent in Florida, the Bahamas, the West Indies and parts of Central America. It belongs to the same family as the century plant (which see). From Progreso, the chief port of Yucatan, a town which exports more sisal than any other city in the world, the United States receives yearly 200,000,000 pounds of fiber, utilized for making binding cord, cordage, coarse cloth, hammocks and bags.

The process of fiber gathering begins with cutting the leaves at the base and removing the spine from the top. They are then fed to machines which strip off the pulp, leaving the yellowish-white, straight fiber. The leaves, which are four or five feet long and about one-third of a foot wide, yield not over four per cent of their weight in fiber, and it takes about 1,000 leaves to produce fifty pounds. The average yield of fiber per acre is about one-half ton.

**SISTERS OF CHARITY.** See Charity, Sisters of.

**SISTERS OF MERCY.** See Mercy, Sisters of.

**SISTINE,** *sis'tin* or *sis teen',* **MADON'NA.** See Madonna and Her Babe; Raphael Santi.

**SISYPHUS,** *sis'i fus,* a mythical king of Corinth, in ancient Greece. He was one of the most crafty of men, and his schemes puzzled even the gods. When Jupiter carried off Aegina, Sisyphus told her father who had done the deed, and in consequence Jupiter sent Death to punish the informer. But Sisyphus outwitted Death and bound him in fetters, so that there was great rejoicing all over the earth, for no man died. Pluto set Death at liberty, and Sisyphus was given into the hands of Death. With his dying breath Sisyphus begged his wife not to bury his body, and when he had gone to Hades he complained to Pluto of the mistreatment, and begged permission to go back to earth and punish his wife for her neglect. Pluto consented, and as soon as Sisyphus was again in his own house, he refused to return. Mercury, however, led him back, and when Pluto had him once more in Hades, he condemned him thereafter to the task of rolling up a high hill a large stone that ever rolled down again.

**SIT'KA,** a town in Alaska, originally the seat of government under the Russian régime, and until 1906 the capital of the territory, under the United States. It is situated on the western coast of Baranof Island (see map, page 136), in a mountainous region. Juneau, the present capital, is 160 miles northeast, and Seattle is 1,130 miles south. The place is the outgrowth of a Russo-American trading station established in 1799, which was then called Archangel; its history as a permanent settlement dates from 1804. Sitka has an agreeable climate, and the winters are not severe. The chief industries of the place are lumbering, mining and the canning of salmon. It is the seat of the Alaskan Agricultural Experiment Station and of the Coast Survey Magnetic Base Station, and the headquarters of the Episcopal bishop of Alaska. Among the notable features are the Sheldon Jackson Museum, maintained by the Presbyterian Mission, the Russo-Greek Church, built in 1816, government public schools and an industrial school for natives (Presbyterian). Population, 900 natives and 160 whites.

**SITTING,** *sit'ing,* **BULL** (1837-1890), an American Indian chief, born somewhere in the territory now comprising North and South Dakota. His childhood name was SACRED STAND, but when in his fourteenth year he killed and scalped his first victim he was called Sitting Bull, to show that he approached in power his father, Jumping Bull. As a prominent chief of the Sioux Indians, he led his tribes in numerous raids during the War of Secession, and though driven out of his territory into Yellowstone Park, was not subdued until 1866. In that year he pretended to accept peace, but in reality secretly led many attacks on settlements. General George A. Custer with a picked force of cavalrymen was sent against him, but in June, 1876, Sitting Bull and his tribe massacred the whole company on the Little Big Horn River.

The chief then fled to Canada, but was allowed to return in 1881. He immediately began to incite rebellion among the redmen, and in 1890, when the Indians were excited over the report of a Messiah coming among them, he aroused so much hatred among the warriors that the government ordered his arrest. While resisting this order on December 15, 1890, he was killed by the Indian police. He was a natural enemy of the whites, and his entire career was one of secret or open murder.

**SIUT,** or **SIOUT,** *se oot'* (also written ASSIUT and ASYUT), the capital of the province of Siut and the principal town of Upper Egypt, is situated about 248 miles by rail south of Cairo, on the west bank of the Nile River and on the Nile Valley Railroad. Siut is the official residence of the governor of Upper Egypt. Though it is located at the head of the caravan route connecting with the Libyan and Sudan oases, it is of less importance as a trading center than formerly because of the development of new commercial routes. In the production of pipe bowls and pottery, however, the town has long been famous; the people also make tulle shawls of a high grade. The town has substantial houses, a college and several fine mosques, and in the vicinity there are numerous ruins of ancient Egyptian structures. A large barrage was recently constructed in the river at this point for irrigation purposes (see EGYPT, subhead *Agriculture,* page 1967). In 1914 the town had an estimated population of 42,750.

**SIVA,** *se'va,* the third god of the Hindu triad, Brahma, Vishnu, Siva. He is represented with five heads and three eyes. He carries the Ganges on his head, wears a necklace of human skulls and carries a trident or pole supporting a skull and one or two human heads. His color is black, fitting a destroyer, and his weapons are an ax, a thunderbolt and a bow. He either sits on or is clothed in a tiger-skin, or may be clothed in a deerskin with a deer in one hand. He has one thousand names.

**SIX'TUS,** the name of five Popes of the Roman Catholic Church, of whom the most important were Sixtus IV and Sixtus V.

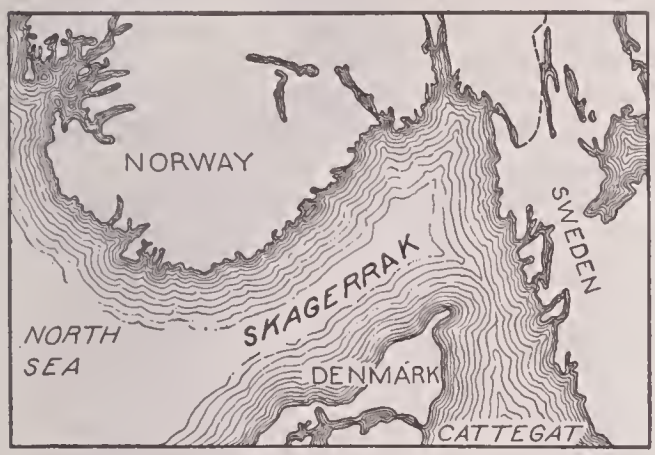
**Sixtus IV,** born in 1414, was of humble family, but by his undoubted ability won promotion in the Church until, in 1467, he attained the rank of cardinal. Four years later he was elected to the Papal chair on the death of Paul II in 1471. The most famous memorial to his reign is the Sistine Chapel in the Vatican, though he also beautified Rome in other ways. He was much concerned in political intrigues, largely because of the actions of different members of his family, whom he had elevated to high positions. This advancement of his relatives is probably the most regrettable circumstance of his career as Pope. He died in 1484, having occupied his high office nearly thirteen years.

**Sixtus V,** Pope from 1585 to 1590, was, like Sixtus IV, of humble parentage, and like him was a member of the Dominican brotherhood. He was born in 1521, was created bishop in 1566 and cardinal in 1570. Even in the latter high office he had yet come little before the public and there was much doubt at his election as Pope in 1585 as to what policies he would pursue. From the first he showed great vigor, firmness and zeal for reform, directing his efforts especially against the bands of robbers and outlaws who infested the country about Rome. So effectively did he deal with these that his name remains until the present the synonym for speedy justice against wrongdoers. He strove to advance the cause of the Church as against the newly-risen Protestantism, but reproved Philip II for the excess in severity which was practiced in Spain in the name of the Inquisition. It was he who blessed the Spanish Armada when it went to its destruction in the campaign against England, and who erected the Vatican Library. A.MC C.

For a list of the Popes see the article POPE, in which is also included a detailed account of the method of election to the Papal chair.

**SKAGERRACK,** *sgahg'er rak,* also spelled SKAGER-RAK and SKAGERRAK, is a broad arm of the North Sea, 130 miles in length, which divides Norway and Sweden at the extreme south and separates those two countries from Jutland

on the south (see colored map, following page 2092). It is the connecting link between the North Sea and the Cattegat, the two forming the entrance into the Baltic Sea. Along the shores of Jutland there is no secure anchorage, for the coast is lined with dangerous sand banks,




LOCATION MAP

but along Norway, eighty miles away, there are several good harbors, the water being over 2,000 feet deep. In the spring of 1916 a battle between the German and British fleets was fought in the Skagerrack (see WAR OF THE NATIONS).

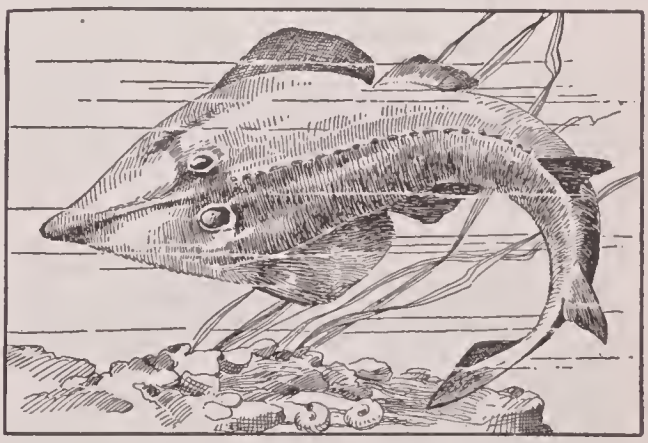
**SKALDS,** *skawlds,* among the Scandinavian races, the name given to the poets who in a measure corresponded to the bards of Great Britain. They lived at the court of some prince, and sang the praises of living heroes and warriors or of the ancestors of their patron. The folk poets who composed roughly and without rules were not reckoned among the skalds, who had to be well educated and versed in all the forms and traditions of Norse poetry. Skalds flourished in Norway as early as the ninth century, and the latest ones lived in the latter half of the thirteenth.

**SKAT,** *skaht,* a game of cards of German origin, supposed to have been invented in 1817 by a lawyer in Saxe-Altenburg. It may be played by three or four persons. When there are four the dealer takes no part in the game though he shares the winnings and losses of the three players. Skat is the most complicated and scientific card game known. It is usually played for money, but the skill required considerably reduces the element of luck.

Thirty-two cards, with four suits, are used. The four suits correspond to hearts, spades, clubs and diamonds but are called respectively *Roth* (red), hearts; *Grün* (green), spades; *Eichel* (acorn), clubs; and *Schellen* (bells), diamonds. The eight cards of each suit run from seven up to ace. The suits have different values, clubs being highest, followed in order by spades, hearts and diamonds. The dealer gives three cards to each player, then four, then three again, making a total of ten cards, and he puts aside two cards for *skat.* Knaves are regarded as trumps, and they take all other trumps. Counting is very complicated, each suit having a different value. Manuals of card games give full particulars of the game of skat, which has never become very popular in America, owing to its complications and difficulties.

Consult Foster's *Skat Manual;* Hoyle's *Games.*

**SKATE,** a flat-bodied fish, belonging to the ray family. It has a pointed snout, expanded pectoral fins, which form with the body a round disk, and a slender tail that has lost its function of locomotion and is used only as a rudder. Skates are usually found on sandy bottoms not far from shore. They feed on mollusks, crustaceans and fishes. Most species are edible. The *common skate* of the Atlantic coast of North America is a foot or two in length. The *barn-door skate* is larger, reaching



SHOVEL-NOSED SKATE

four feet in length, and there is a species off the California coast that sometimes grows to be six feet long. Another well-known species is the *shovel-nosed skate.* The egg cases of the fish are sometimes picked up on shore. They are popularly called "mermaids' purses." A deep-sea skate has been discovered near the Faroe Islands in the North Atlantic.

**SKATES AND SKATING.** A modern skate is a steel blade affixed to a wooden or metal base. It is fastened to the shoe by means of straps, clamps, or screws. There are several well-known types. The *club skate* is entirely of metal and is clamped on the foot. Its blade is rocker shaped. The *Hudson River skate* has a long and narrow straight blade, wooden top and straps. The *Norwegian skate,* introduced

from Norway, is similar, but is very light in weight and is screwed to the sole of a special skating shoe. The *hockey* combines the club and Norwegian types in a short, thick, straight-bladed skate screwed to the shoe. It is used in speed skating, while the club skate is better fitted for fancy or figure skating. The substitution of wheels for the blade has resulted in the roller skate, which does not require ice but can be used on any smooth, solid surface.

For centuries skating has been a popular sport among people of Northern countries. It was earliest developed by the Norsemen, Swedes, Danes, Finns and Dutch. The great antiquity of the sport is shown by its mention in the earliest known examples of Scandinavian literature. The primitive skater tied a bone to his foot and used a stick to aid him in his progress over the ice. During the past century, races and matches have become common in Europe and North America. National associations foster the sport and arrange for national and international contests. As one of the most healthful and invigorating of sports, skating is attracting more enthusiasts every year. In the winter of 1915 it became the most popular pastime in large cities, where rinks were constructed on roofs and in hotels to take the place of the dance halls which had been the principal amusement centers of the previous season.

Consult Browne's *Handbook of Figure Skating.*

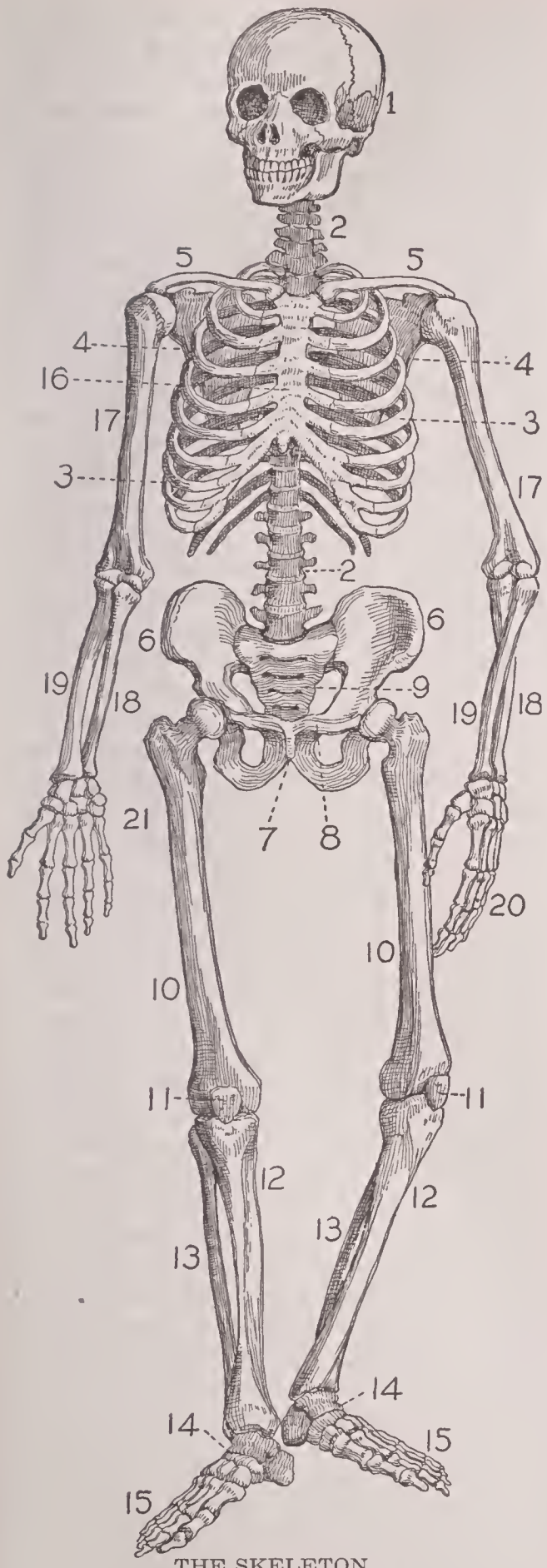
**SKEAT,** *skeet,* WALTER WILLIAM (1835- ), an English scholar and philologist, whose edition of Chaucer is universally recognized as standard. Born in London, he received his schooling at Kings College, Highgate Grammar School, and at Christ's College, Cambridge. He became a fellow of Christ's College in 1860 and in 1878 was elected professor of Anglo-Saxon. Skeat's most important work was as scholar and editor, not as teacher. His researches in philology, especially Anglo-Saxon and Middle English, gave him an eminence which became more marked on the publication of his editions of Chaucer's works and of Langland's *Piers Plowman.* Of his many other works the most important is the *Etymological English Dictionary,* the most comprehensive and authoritative book in its field. Skeat shares with Frederick Furnivall the distinction of being chiefly responsible for the revival of England's interest in its early literature.

**SKEENA,** *ske'na,* **RIVER,** one of the many short streams which flow westward across British Columbia into the Pacific Ocean. Its course is about 335 miles long, and its drainage basin covers an area of 19,300 square miles. Though not a large river it is economically of great importance, for it is one of the greatest fishing grounds for salmon in the world, and with the exception of the Fraser River fisheries, is the most valuable in British Columbia. The halibut catch in Hecate Strait, off the mouth of the Skeena River, is the largest in the Dominion of Canada.

The Skeena rises in the north-central part of British Columbia, and at one point in its upper course is less than twenty miles from the headwaters of the Finlay, the principal tributary of the Peace River. Skirting the northern end of the Firepan and Babine mountains, which break the surface of the Interior Plateau, the Skeena flows in a general southwesterly direction, cuts a path across the Coast Range and empties into the sea about ten miles south of the city of Prince Rupert. W.B.

**SKEL'ETON.** The bones of all vertebrate animals are joined together to form a symmetrical, flexible core which gives shape to the body and constitutes a protecting framework for the vital organs. In man, the highest of the vertebrate creatures, this bony core, or *skeleton,* is a marvelous example of adaptation to human needs. There are about 200 separate pieces to the skeleton (see accompanying diagram), all nicely fitted together and held in place by strong bands of flexible tissue (see LIGAMENT). These pieces, the bones, are grouped into two main divisions, the *axial* and the *appendicular* skeletons.

The axial skeleton is made up of the bones of the head, neck and trunk. Its nucleus is the spine (also called spinal column and backbone), which forms an axis for the support of the other parts of the body. In the upper portion are twenty-four separate bones called *vertebrae,* seven of which *(cervical)* are in the neck, twelve *(dorsal)* in the region of the chest, and five *(lumbar)* in the loins. To the dorsal vertebrae are attached the ribs, there being twelve on each side. The upper ribs are fastened in front to the breastbone, or *sternum.* Below the last lumbar vertebra is the *sacrum,* which consists of five separate bones in infancy, but of one solid structure in adulthood. At the tip of the spinal column is the *coccyx,* also a single bone in maturity, but consisting of four bones in early life. The sacrum and coccyx are regarded as continuations of the vertebral column. This central axis is one of




THE SKELETON

1. Cranium
2. Vertebrae
3. Ribs
4. Scapula or shoulder blade
5. Clavicle or collar bone
6. Hip bone
7. Coccyx
8. Pubes
9. Sacrum
10. Femur or thigh bone
11. Patella or kneecap
12. Tibia
13. Fibula
14. Metatarsal bones
15. Phalanges
16. Sternum
17. Humerus
18. Ulna
19. Radius
20. Phalanges
21. Metacarpal bones

the most marvelous structures of the body, for it possesses just the right combination of rigidity, flexibility and elasticity.

The parts of the appendicular skeleton are attached to the central axis in such a way as to afford great freedom and variety of movement. This portion of the framework consists of the arm bones and the shoulder girdle *(pectoral arch)* and the leg bones and hip bones *(pelvic arch)*. The pectoral arch is made up on each side of a collar bone and a shoulder blade; the hip bones, or pelvic arch, of a single structure called the *os innominatum* (bone without a name). As may be seen by the diagram, the collar bone on each side is attached to the shoulder blade and also to the breastbone, while the bones of the lower limbs join the pelvic arch in the hip joints. The pelvic arch in turn is attached to the lower part of the backbone. Thus all parts of the framework are joined together, and each part has its work in the body mechanism. W.F.R.

**Related Subjects.** The various parts of the skeleton are discussed in more detail under the following headings:

| | |
|---|---|
| Arm | Foot |
| Bone | Hand |
| Face, The | Head |

The bones of the arm, foot, hand and head are fully illustrated and named under those headings. See pages 372, 2253, 2681, 2738.

**SKI,** or **SKEE,** *ske,* a Norwegian name for wooden runners from three to four inches broad and from five to ten feet in length, used by men, women and children of northern countries for walking over snow and for coasting down snow-covered hills. Skiing as a sport is extremely healthful exercise, and numerous ski clubs exist in all northern countries where winter snows are plentiful. Contests to develop skill are held in many places; these include long and short runs, but the greatest interest always attaches to feats of jumping. The contestants glide rapidly down a snow-covered hill, and at a certain point in the descent they are projected into the air by a sharp elevation in the path, alighting at a great distance down the hillside. A jump of 130 feet is not unusual.

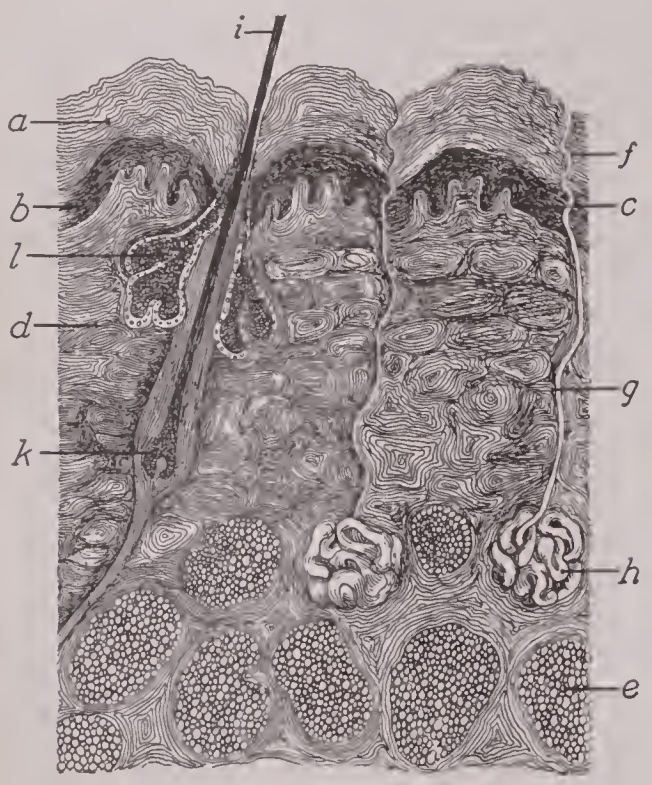
The infantry soldiers of Sweden and Norway are equipped with skis and accomplish very long marches over the snow-covered ground. In forest lands skis are not as useful as the

ordinary snowshoe, but in open country they possess great advantages, especially in speed. The ski is attached to the feet by means of straps which allow the heel to rise and fall as in walking, but keep the toes firmly fixed to the wood. In walking uphill a zigzag course must be pursued, but downhill the motion may become an extremely swift slide, steering being done by means of a staff.

Consult Rickmer's *Ski-ing;* Fulton's *With Ski in Norway and Lapland.*

**SKIMMER,** *skim'er,* a name sometimes applied to the SCISSORBILL (which see).

**SKIN.** We usually think of the skin as that part of the body-covering which we can touch and see. As a matter of fact, the top skin is only a thick, protecting layer which covers what is known as the true skin, or *dermis. Dermis* is




CROSS SECTION OF THE SKIN
(Greatly magnified.)

(*a*) Scarf skin, or dead epidermis; (*b*) growing layer of epidermis; (*c*) layer of cells filled with coloring matter; (*d*) true skin; (*e*) fatty tissue; (*f g h*) sweat gland and duct; (*i k*) hair with follicle and papilla; (*l*) sebaceous gland.

derived from the Greek word for *skin,* and is compounded with *epi,* meaning *over,* to form the word *epidermis.* The latter is the name for the upper layer, which is also called *cuticle.* An examination of the accompanying diagram will show the structure of the skin layers.

**The Epidermis.** The top layer is made up of countless cells placed side by side like the paving stones in a street, but instead of one compact row there are perhaps twelve or fifteen rows, arranged one above the other. These cells grow from the bottom up. In the lowest row they are columnlike in shape, and their long axes are perpendicular to the cells of the under skin. Above are several rows of roundish cells, which grow flatter and flatter as the surface is approached. They also become drier as they are pushed upward by new cells below, and when the surface is reached they are shed off in thin flakes. This is the "dead skin" one rubs off with the towel in bathing. In the deeper cells of the epidermis are found nerves, but there are no blood vessels in this layer. That is why a man can pass the razor over his face without discomfort. A cut which draws blood must be deep enough to reach the dermis. In the deeper layers is also found the pigment which gives color to the skin. Dark races have an abundance of pigment and white races little or none. It sometimes happens that exposure to the sun causes an increase of coloring matter in spots, and freckles result. Hair and nails are parts of the epidermis that have been excessively developed for special purposes.

**The Dermis** consists of a closely woven network of connective tissue, from one-sixteenth to one-eighth of an inch thick, within which are embedded blood vessels, lymphatics, nerves, glands and hair follicles. In its lowest part the dermis passes gradually into a loose network of fibers called *areolar subcutaneous tissue,* which allows the skin to move freely upon the parts below. On the outer surface of the dermis are innumerable elevations about one-two-hundredth of an inch in length, called *papillae* (from the Latin word for *pimple*). The papillae fit into tiny pits on the under surface of the epidermis, so that the two layers are firmly molded together. In the papillae are found the nerves that give the sensation of touch, and they are especially well developed in the inside of the hands, where they are arranged in rows. The fine ridges on the balls of the fingers and thumb—unalterable identification marks—show where the epidermis falls in between adjacent rows of papillae. When a small group of papillae becomes overdeveloped and projects above the surface of the epidermis, a wart forms. People become wrinkled when the fat and other soft parts beneath the dermis are absorbed and the skin does not shrink at the same rate. Building up fat is therefore the proper way to keep the skin smooth.

**The Glands.** These are among the most important organs of the skin. There are two kinds, those that pour out sweat, or perspiration, and those that discharge oil. The sweat

glands are minute tubes that extend from the surface of the body down to the subcutaneous tissue. There are over two million of them, distributed over the surface of the entire body, but most abundantly on the palms, the soles and the forehead. By means of these glands the skin performs a twofold function: it excretes waste matter, and also regulates the heat of the body, for the sweat, as it evaporates, cools off the surface. The oil *(sebaceous)* glands, which generally open into hair follicles (see illustration on page 2659), secrete an oily substance that keeps the hair smooth and glossy and prevents the skin from becoming too dry. So-called blackheads form when the tiny openings of the face oil glands become filled with dirt.

**Care of the Skin.** The skin must be washed frequently to keep the glands in good working order. Neglect in this matter will cause the pores (the mouths of the glands) to become clogged. A fresh, rosy complexion is always an indication of health and cleanliness, while pimples and other unsightly blemishes usually tell a story of unhygienic living. One should avoid tight clothing and indulgence in rich foods and unwholesome stimulants if a clear skin is desired. A sensible régime in regard to food, ventilation, dress and bathing is of far more value than the practice of using cosmetics. In regard to bathing one should exercise moderation in the matter of hot water and soap, for if these are used too lavishly the skin is liable to become dry and scaly.

**Skin Grafting** is the transference of living skin to an area made raw by a burn or unhealed sore or ulcer. There are several methods employed; the most common consists in placing superficial layers of skin on the wound. Sometimes, however, the entire thickness of skin, including subcutaneous fat, is laid on the sore spot. If the operation is successful the new graft causes the wound to heal. Skin grafting has often been the means of saving life, and it has sometimes been made possible only through the heroism of a person willing to give a portion of healthy skin. C.B.B.

**Related Subjects.** The following articles in these volumes present various phases of the subject. Among them are articles on skin diseases:

Baths and Bathing
Boil
Dandruff
Eczema
Hair
Hookworm
Hygiene, subhead *Personal Hygiene*
Itch
Nails
Nervous System
Perspiration
Touch

**SKINNER,** *skin'er,* Otis (1858- ), an American actor who has no superior as an impersonator of romantic rôles. His acting shows a blending of humor, sentiment and buoyancy that has made him an established star on the American stage, and his art has a finish that could come only from thorough training and long experience. Skinner, in fact, had the best of teachers, for he worked with Edwin Booth and Lawrence Barrett when they were in the height of their successful careers, and for five years (1884-1889) he played with Augustin Daly's company. Skinner was born at Cambridge, Mass. He made his first appearance as a professional actor in 1877, in Philadelphia, and played for two years in that city with the Walnut Street Stock Company. After leaving the Daly organization he was leading man for Madame Modjeska through several seasons. His greatest success of later years was *Kismet,* a play of the romantic type, but he also won praise for his work in *Cock o' the Walk* (1915-1916), a character comedy by Henry Arthur Jones. In 1917 he appeared successfully in *Mr. Antonio,* a play by Booth Tarkington.

**SKU'A,** the bird of prey of the ocean, a fierce, gull-like creature with a strong, hooked beak and brown and white plumage. It follows the gulls and terns of Arctic and Antarctic waters, taking from them the fish they

THE SKUA

have caught, and also devours smaller birds and their eggs. Skuas build their nests of sticks and grasses on the ground or bare rocks. The eggs are two in number, olive colored, with spots of brown or chocolate. The birds are artful in concealing their nests and fight savagely if they are discovered. See Gulls.

**SKUNK,** a common member of the weasel family, native to North America. It is stockily built, about the size of a large cat, with

a long, pointed nose and an arched back, short legs and a mincing gait. The fur, which is long, thick and shiny, is black, marked with prominent white stripes down the back and a white patch on the forehead. The long, bushy tail is black on top and white underneath. The skunk is distinguished by its peculiar means of defense, which is a pair of glands containing a fluid of strong odor that is ejected with considerable force when the animal is frightened. The skunk lives in a hollow tree, a burrow, or

THE SKUNK

under sheds, and feeds upon insects, mice, gophers, reptiles, squirrels, eggs and poultry. It makes its raids on the poultry yard at night and often does considerable damage. The Texas white-backed skunk and the striped skunk of the South are well-known and beautifully-marked species.

The skunk is one of the most valuable fur-producing animals in North America, about $1,500,000 worth of skins being sold annually. Skunk farms are maintained in Canada and some other localities and are proving profitable. Skunk grease is used in tanning leather.

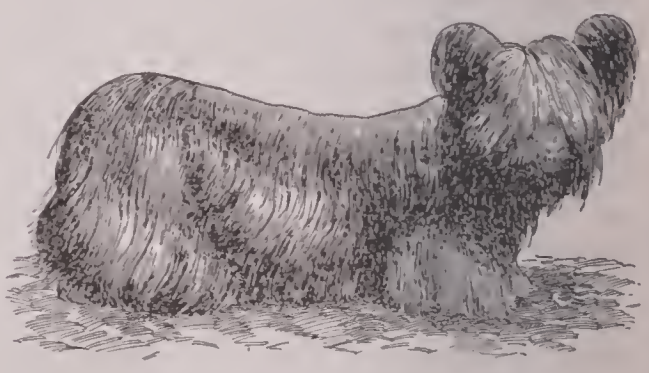
Consult Coues' *Fur-Bearing Animals;* Holbrook's *Skunk Culture for Profit.*

**SKY,** a term applied to the apparent arch or vault of the heavens, that infinity of space surrounding the earth, the lower portions of which are the regions of winds, rain and clouds. Omar Khayyam, the Persian poet and philosopher, writes of the "huge, inverted bowl" which we call the sky.

The word is generally supposed to be of Anglo-Saxon origin and in ancient literature is variously written *skewes, skye, skiwes* and *skie.* In fair weather the sky is a clear blue color, but when clouds are present it is obscured and we cannot see into the vast space signified by the word. It is customary to speak of a dull or clouded sky; in reality it is not the sky that is dull or clouded, but the obscurity is caused by clouds that have come between earth and sky. The word *firmament* is sometimes used as referring to the sky, but this is hardly correct, as firmament is applicable only to the solar system as a whole and not to the sky in particular.

Poetry and literature of all ages contain many allusions to the sky, for it has always exercised an irresistible attraction. The expression, "laud him to the skies," is familiar, and is a synonym for extravagant praise. "A bolt from a clear sky" has long meant some event as unexpected as a lightning flash from cloudless heavens. The word is also used as a verb, especially applied to art exhibition. To "sky" a picture means to place it so high up on the wall that it cannot be seen plainly by people on the floor.

**SKYE TERRIER,** *ski ter'i er,* one of the smallest of the terriers, native to Northern Scotland and often kept as a house pet. It is a long-bodied, short-legged dog, from eight to ten inches high and about twenty-two inches long. Its coat is double, with an under layer of soft, short hair, and an outer one with long, stiff and straight hair. A black muzzle, rather long head and neck, erect or hanging ears, and a tail carried no higher than the back, characterize this little animal, which may vary in color from sand or mottled bluish-gray to



SKYE TERRIER

black. Two familiar species are the *Clydesdale,* or *Paisley,* with small, pointed, erect ears which give it an alert appearance, and the *Yorkshire,* still smaller, with very silky hair. Skye terriers are good rat hunters.

**SKY'LARK.** See LARK.

**SLAG,** a stonelike compound formed in the process of extracting metals from their ores. It contains silica, alumina, lime and various earthy substances, together with a small quantity of the metal from the reduction of which it results. In the improved methods of smelting, little of the ore remains in the slag, but for-

merly a large portion was wasted, and slags could often be smelted with profit. Various economical uses have been found for slag. When reduced to powder it is used in making mortar, and that containing phosphorus makes a good fertilizer. It is also cast into blocks which are used for roadbeds, and from iron slag an imperfect glass is manufactured from which vases and various small articles are made. In Europe melted slag is used to impart a glaze to bricks.

**SLAN'DER,** a story maliciously uttered with the intention of injuring, or tending to injure, the reputation or good name of another. Written defamation of character is termed *libel.* See LIBEL.

**SLANG,** a word which originally meant the jargon used by the vagabond classes, thieves, beggars and tramps, to conceal their meaning from other people. Authorities agree that the term must be connected with the verb *sling,* which is sometimes vulgarly used in such expressions as *to sling language,* for *to abuse.* To-day slang, as generally understood, includes colloquialisms and inelegant words, as well as phrases which have originated in the rude speech of vagabonds or the uneducated classes, or such words as have been intentionally perverted and given meanings which are whimsical, ironical or extravagantly figurative. Mere dialect peculiarities or idioms of some one locality or class of persons are not to be classed as slang, which of its very nature is a conscious substitution of an unconventional expression for the formal, correct mode of speech (see IDIOM).

Not by any means is all slang vulgar in its origin; much is adopted from the technical language of the trades or professions and applied figuratively to untechnical matters. Thus, the expression, "He's gone off on a sidetrack" clearly came from railroading, and is figuratively applied to a deflection from the main purpose. One might use the above sentence without being aware that it is slang. Many slang phrases are, however, taken directly from the speech of thieves and vagabonds, and carry the marks of their origin with them, and are to be avoided. Such, for instance, are *to douse the glim* for *to put out the light,* a *cove* for a *man,* or a *wipe* for a *handkerchief.*

**Contributes to Language.** There is much to be said in defense of one phase of slang. Every language must grow, must have new words added to it and new meanings attached to its old words; and of the means by which these changes are accomplished, slang is one of the more important. Particularly does it enrich the figurative side of a language, for metaphor is at the basis of most slang. To be sure, a very large proportion of slang words and phrases die out after a very brief existence. Nothing seems more utterly dead than the slang of a few years ago; but an occasional expression lives, rids itself of its vulgar connections, and fills a place in the language which has never been quite so exactly filled before. The word *tandem,* for instance, was originally university slang, and grew out of the humorous application of the word, which the dictionaries translate "at length," to space ideas as well as time ideas. Now the colloquial significance is no longer felt, and the word is regarded as correct literary English. Other words which have had the same history are *hoax, mob, blizzard, humbug* and *gerrymander.* Occasionally a word which had its origin in the very lowest ranks of society, among the professional thieves, meets with this same fate; thus the word *prig,* which meant a *thief,* has come through successive changes to denote a kind of person that no other word fitly describes.

**Its Dangers.** On the other hand, there are dangers in the habitual use of slang. These words are not, for the most part, attempts to supply deficiencies in the language; they are revolts against propriety and purism, sometimes apt and striking, but as often not. In either case, they tend to narrow a person's vocabulary, to do away entirely with fine shades of meaning. The first time anyone said "That's a stunning gown," the figure was forceful and perhaps conveyed the idea better than any other expression could have done; but if "perfectly stunning" is applied to everything attractive, from a salad to a Beethoven sonata, the force is lost, and a number of adjectives are ignored which might far more accurately express the pleasure received. A.MC C.

Consult Ware's *Passing English of the Victorian Era;* Farmer and Henley's *Dictionary of Slang, Jargon and Cant.*

**SLATE.** In most modern schoolhouses we find blackboards of stone. They are usually of a dark gray or a purplish-brown color. They have a smooth, even surface and are pleasing to write upon. It may be that the roof of the schoolhouse is covered with the same sort of stone. Thin slabs of this stone are smoothed on both sides, cut into small sizes, enclosed in wooden frames and sold for school children to write on. This stone is slate, a rock com-

posed chiefly of quartz or silica and clay and changed into its present form by heat and pressure.

Slate splits into thin layers and varies in color from light gray to green, red, brown and almost black. It is of different degrees of hardness but all varieties are easily scratched with a knife. It is found in all localities where metamorphic rocks have been formed, and the layers are often tilted at various angles. It is one of the most durable rocks and withstands weathering as well as granite. The best varieties are used for blackboards, for covering roofs, for writing slates and for mantels.

A YEAR'S PRODUCTION
The four leading states which quarry slate.

Marbleized slate is made by painting the background on the stone and dipping it in water upon which the coloring matter has been spread, then baking the stone. Very beautiful designs are produced in this way. The most extensive slate quarries in the United States are in Pennsylvania, Vermont, Maine and Virginia. Little is quarried in Canada. The most important quarries of Europe are in Wales and Ardennes, France. The slate quarried yearly in the United States is valued at over five and a half million dollars.

Consult Dale's "Slate Deposits of United States," in *Bulletin No. 586,* United States Geological Survey.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Cleavage | Metamorphism |
| Geology | Quarry and Quarrying |

**SLATER FUND,** an endowment of $1,000,000, made in 1882 by John Fox Slater, a New England manufacturer, for the purpose of conferring a "Christian education on the lately emancipated population of the United States." For this gift Congress voted a resolution of thanks to Mr. Slater, and presented him with a medal. The fund was placed in charge of a board of trustees, and so well has it been administered that it now yields an annual income of about $80,000.

The fund has been devoted principally to the support of those negro schools which specialize in normal and industrial training, including the Tuskegee Normal and Industrial Institute, and the Hampton Normal and Agricultural Institute, both of first importance. The money is used to pay salaries of teachers, directors and principals, and for supplies and running expenses. An annual grant of $1,000 for three years, beginning in 1908, was made to the public school officials of Charleston, S. C., to support an industrial school for negroes in connection with the public school system, a notable extension of the activities of the foundation.

Consult Ayres' *Seven Great Foundations;* also reports of the United States Bureau of Education.

**SLAVERY,** *slayv'er i.* In the childhood of man our barbarous ancestors, when they fought their hostile neighbors, made no captives. They did not conquer their enemies; they destroyed them. So slavery, when it came, was a forward step in the march toward the brotherhood of man, for although it ignored the rights of fellow creatures it at least recognized their usefulness, their ability to benefit the world by their presence. Captive men and women did the rough work of a community, and their masters gained leisure time—chiefly time to be idle, but also time to think. Had the older system of slaying all enemies persisted, we might never have reached the state of society which gave us Abraham, Moses and David, Homer and the many artists of ancient Greece, and Cicero, Horace and Vergil.

But the slavery of those taken in war was a different thing from the enslavement of fellow citizens for debt or the trafficking in men and women of a lower state of civilization who could by no stretch of the imagination be considered enemies. And history records that while slavery of the first type ended gradually through economic and political changes, slavery for debt and slavery of the black race were destroyed by moral uprisings.

**Slavery in the Ancient World.** When Abraham made his covenant it applied both to Abraham's family and to him

> that is born in the house, or bought with money of any stranger,

and slavery continued among the Hebrews until they themselves were carried away into captivity. But the laws of Moses provided that all slaves should be well treated, and that a Hebrew servant should go free after six years, and a foreigner in the year of jubilee, which occurred twice in a century.

The story of Ulysses' visit in disguise to the swineherd Eumaeus, in the *Odyssey,* teaches

us that in Homer's time slaves were kindly treated, but that they were purchased from pirates and were sometimes of higher birth than their masters. Later it was customary for men in poverty to sell their children or publicly abandon them, and for debtors to sell themselves for their debt; but Plato and his followers declared that one Greek ought never to make a slave of another. Like Aesop, who is said to have been a tutor, slaves could hold positions of responsibility, and could sometimes purchase their freedom.

In Rome slavery flourished as long as the legions continued their conquests. Wealthy men maintained large numbers of slaves recruited from war, piracy and a special slave trade, and some authorities believe that at the height of the empire there were three slaves to every single freeman. Slaves were often given their liberty and sometimes rose to greatness, as did Terence and Epictetus. The advent of Christianity had less to do with the end of Roman slavery than the stoppage of the sources from which slaves were drawn. There was in fact no sudden shift from slavery to freedom, but a gradual change into serfdom.

**Modern Revival of Slavery.** Just before the middle of the fifteenth century Portuguese explorers in Africa were given several black slaves in ransom for Moors whom they had captured, and the Portuguese began the capture and transportation of negroes into Europe. In 1516 Charles V of Spain gave permission to carry slaves into the colonies, and so profitable did the trade prove that several of the nations engaged in it. By the time of the American Revolution the British were carrying more than half of the blacks that were brought to the Western world.

Though Denmark was the first nation to decree the end of the slave trade, in 1792, it was in England that the great fight against it was begun. The English Quakers started the movement in 1729; their American brethren, in 1696. Through the efforts of Thomas Clarkson and William Wilberforce, the House of Commons passed a bill against the trade in 1792, but the Lords did not approve the step until 1808, in the very same month in which the United States prohibited the further importation of Africans.

The history of slavery in the United States can best be studied through the list of related topics given below. Franklin, Adams and Hamilton from the North and Jefferson and Madison from the South opposed it, and Washington, though he owned slaves, freed them in his will, previously declaring in his farewell address that it was among his "first wishes to see some plan adopted by which slavery in this country may be abolished by law."

In Haiti, where there were sixteen blacks and one mulatto to every white, the slaves revolted against the French in 1791 and established a republic. Great Britain freed all slaves in her colonies in 1833, and other European nations gradually followed. Most of the South American republics declared all men free from the beginning of their independent existence, but Brazil did not take the step until 1871.

Slavery has never ended in Mohammedan countries, and an illicit trade is still carried on in Africa. Dean C. Worcester, formerly Secretary of the Interior for the Philippines, claims that slavery still exists in remote sections of those islands. C.H.H.

Consult Merriam's *The Negro and the Nation;* Woodson's *The Edueation of the Negro Prior to 1861;* George's *Politieal History of Slavery.*

**Related Subjects.** The following articles in these volumes have a bearing on the subject of slavery. The majority deal with United States history, but a few have a more general significance:

Abolitionists
Brown, John
Compromise of 1850
Confederate States of America
Crittenden Compromise
Dred Scott Decision
Emancipation Proclamation
Fugitive Slave Laws
Garrison, William Lloyd
Helots
Kansas-Nebraska Bill
Lecompton Constitution
Lincoln, Abraham
Mason and Dixon's Line
Missouri Compromise
Phillips, Wendell
Reconstruction
Serfs
United States, subtitle *History*
War of Secession
Wilberforce, William
Wilmot Proviso

**SLAVONIA,** *sla vo'ni a.* See CROATIA AND SLAVONIA.

**SLAVS,** *slahvz,* or *slavz,* or **SLAVONIANS,** *slah vo'ni anz,* the general name of a group of peoples forming a branch of the Aryan family, who live chiefly in Eastern Europe and Siberia. They number approximately 184,000,000, according to recent estimates, and include Russians, Poles, Wends, Czechs (Bohemians and Moravians), Slovaks, Slovenians, Croats, Serbians, Bulgarians, Montenegrins and the peoples of Bosnia and Herzegovina. They are somewhat shorter than the average Aryan, and have broad heads, pale white, swarthy or light brown skin, and brown, gray or black eyes. For many centuries the Slavs, who were slower in developing than most of the other peoples of

Europe, were greatly oppressed, and their progress toward freedom and self-government is one of the notable movements of recent history. The Bulgarians, Serbians and Montenegrins, for instance, have been freed from Turkish oppression, and the Russians have overthrown one of the most despotic governments known in history.

**Related Subjects.** For details concerning the various Slav peoples, consult, in these volumes, the following articles:

| | |
|---|---|
| Austria-Hungary (racial map) | Czecho-Slovakia |
| Balkan Peninsula | Jugo-Slavia |
| Bosnia | Montenegro |
| Bulgaria | Poland |
| Croatia and Slavonia | Russia |
| Czech | Serbia |
| | Slovaks |

**SLEDGE,** *slej,* a means of conveyance, in which the body is mounted on runners instead of wheels, and so of effective use only when the ground is covered with snow. When crudely made, they are called sledges, or sleds, as the dog sledge of the Eskimos, the reindeer sledges of Lapland, or the bobsleds of America. With a body fashioned artistically they are known as *sleighs* all over the world where there is snowfall. In the United States and Canada light and graceful sleighs are also known as cutters.

**SLEEP,** the state during which the nervous system renews the energy expended during the waking hours. The beneficent effects of sleep are known to every one, and no one will say that this rest period of tired humanity is overpraised by Shakespeare in his familiar lines from *Macbeth:*

> . . . . . the innocent sleep,
> Sleep that knits up the ravell'd sleeve of care,
> The death of each day's life, sore labor's bath,
> Balm of hurt minds, great nature's second course,
> Chief nourisher in life's feast.

Coleridge, too, in *The Ancient Mariner,* says of sleep that

> . . . . . it is a gentle thing.
> Beloved from pole to pole.

Throughout the active hours of the day energy is used up faster than it is stored and the tissues are worn faster than cells are formed to repair them; therefore both the mind and body need periods of rest. The most complete rest is found in sleep. The conscious activities of the mind cease, the heart beats more slowly, the respiratory movements are less frequent and the muscles are relaxed. An infant sleeps most of the time; a young child needs twelve hours of sleep out of the twenty-four, while eight hours is ordinarily sufficient for the adult. Sleep at night is more refreshing than that in the daytime. It is deepest during the second hour after going to sleep, and the nervous system receives a greater shock if the sleeper is awakened during this hour than if at any other time. Insomnia, or chronic sleeplessness, is a distressing ailment which should never be neglected.

**Sleeping Porches.** The lungs call for pure air, and sleep is most refreshing when the sleeper is supplied with an abundance of pure air. Tuberculosis and other lung diseases are frequently cured by sleeping in the open air. The most sanitary of modern dwellings are provided with sleeping porches which are so located as to seclude the occupants from view, and so protected with screens as to keep out flies and mosquitoes. With proper protection in the way of bedding and night robes, these porches may be occupied throughout the year.

Consult Powell's *Art of Natural Sleep;* Bruce's *Sleep and Sleeplessness.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Baby | Heating and Ventilation, subtitle *The Ventilating Problem* |
| Dreams | |
| Insomnia | |
| Somnambulism | |

**SLEEP'ING SICK'NESS,** a fatal disease occurring in the equatorial districts of Africa, so called because in the last stages the victim passes into a state of heavy drowsiness which terminates in coma and death. The disease is caused by a minute animal parasite, the carrier of which is the tsetse fly. The early symptoms are irregular fever, headache, inability to sleep and weakness. The glands all over the body are enlarged, and a red eruption appears on the skin. As the disease progresses the victim grows continually weaker, and a desire for sleep comes upon him, increasing until he can with difficulty be aroused. There are tremblings of the hand and tongue which, toward the last, develop into convulsions. Every patient sleeps himself to death, for there is no cure. Careful nursing has been known to postpone the later symptoms. The duration of the disease varies with individuals; a victim may live for several years.

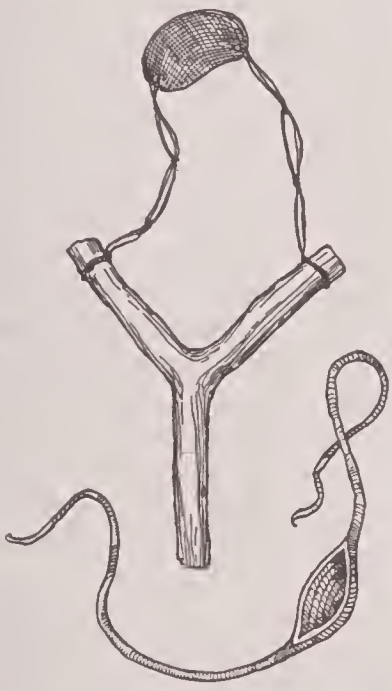
**SLEEP WALKING.** See SOMNAMBULISM.

**SLIDELL,** *sli del',* JOHN (1793-1871). See MASON AND SLIDELL.

**SLIME MOLDS,** minute plants of very simple structure which are found upon decaying wood and sometimes on soil containing a large proportion of humus. These molds are of spe-

cial interest because of their resemblance to minute animals. In fact, they have been described as belonging both to the animal and to the vegetable kingdoms. The spores germinate in moist soils and in humus, forming a simple cell with a single, slender, hairlike attachment, by means of which they move about. Later they lose the projection, and the cells unite in a common mass which has the appearance of mold. The cells take a variety of forms in the process of development. The masses are frequently found on stumps and bark. The largest of them may be several inches square, but they are usually much smaller.

**SLING,** a weapon of very ancient origin, for throwing stones or other missiles. It is probably the most ancient of all weapons for increasing the force of projectiles. In its simplest form it consists of a leather or hide strap, to each end of which is fastened a string. The stone to be thrown is placed on the strap, and the operator holds the two cords in his hand. Whirling the sling rapidly round his head to attain velocity, he releases one end, and the stone or other missile is discharged with the initial velocity at which the sling is whirled at the moment of release. This simple form is the oldest form of sling known, it having come down the centuries practically unchanged.



TWO KINDS OF SLINGS

There are many allusions to slings in the Bible, the most familiar reference being to the slaying of Goliath by David with a stone (*I Samuel* XVII, 49). It is also recorded that 250 slingers of the Benjamites "could sling stones at an hair breadth and not miss" (*Judges* XX, 16).

The ancient inhabitants of the Balearic Islands were famed for skill with the sling, and its use was of great value to the armies of Egypt, Greece and Rome. In the Middle Ages slings attached to a staff were used to hurl big stones against fortifications and castles. This sling was hurled with both hands and the size of the stone was limited only by the strength and skill of the slinger. In the ordinary one-hand sling the stone was "the size of a man's fist."

**Sling Shot.** In America a small hand catapult (which see) is called a *sling shot,* or *sling,* and is made by fastening elastic bands on the two ends of a forked stick. At the other ends of the elastics is a leather pouch in which is stone or small bullet is placed. The fork is held in one hand and with the other hand the elastic is stretched, the thumb and first finger holding the missile in place. Suddenly released, the elastic is projected with great force. In most cities the use of slings is forbidden. Partridges, small birds, rabbits and squirrels are easy prey to an expert in the use of this simple catapult.

**Bola.** This is a kind of sling used in many South American countries. It consists of three to six small stones or bullets securely fastened to the ends of an equal number of strings about two and a half feet long. The ends without weights are tied together. The slinger holds the tied end and whirls the bullets round his head. When let go into the air the bullets separate and frequently succeed in entangling legs of animals or wings of birds at which they are thrown. In some South American countries the bola consists of only one rope about six feet long with a weight at each end. F.ST.A.

**SLIPPERWORT,** *slip'er wurt,* sometimes called *pocket flower,* is a low, shrubby, evergreen plant whose blossoms have something the shape of a pouch or slipper. The flowers are abundant and showy, ranging in color from creamy-white to yellow, maroon or crimson, often spotted with darker shades, and are seldom marked alike on two different plants. The foliage leaves are large, close-growing and feltlike. Twelve inches is the usual height of the dwarfed variety of slipperwort, the taller species often reaching eighteen inches. All species are natives of South America, but several are cultivated in hothouses and gardens in America.

**SLOE,** *slo,* a spiny, branching shrub, related to the plum and found in Europe, Central Asia and on the mountains in the southern and eastern parts of the United States and Southeastern Canada. It has pure-white blossoms, which appear before the leaves and later give place to small, black fruit, about the size of a pea. The latter are used for making wine,

jelly, preserves and dyes. Canes and tool handles are made from the hardy branches of the shrub.

**SLOTH,** *slawth,* a group of animals belonging to the order of Edentata (which see), which includes mammals lacking in teeth or with only rudimentary ones. The sloths, as may be seen by the accompanying picture, have a most pe-

THE SLOTH

culiar method of locomotion. They move along the branches of trees upside down, and in this fashion they also sleep. In fact, they rarely come down to the ground, nor do they need to, for they feed on leaves, buds and young shoots. As they sleep by day and always move with great caution, the name sloth has been applied from the mistaken idea that they are lazy and sluggish. As a matter of fact they show considerable agility in all of their movements.

These queer animals are almost grotesque in appearance, with their tailless bodies, earless heads and blunt noses. The coarse hair is of a grayish color, which renders them inconspicuous. A sloth asleep looks very much like the stump of a bough, especially when, as is often the case, a peculiar growth of green alga is found on the hair. There are two subfamilies, one containing sloths with two toes on the front feet, and the other including those with three toes on these feet. All are natives of tropical America.

**SLOT MACHINES,** devices of various kinds, some used for legitimate purposes of trade and others designed solely for gambling. All work on the principle that a coin of certain named value must be deposited in a slot, and this sets the mechanism in motion. Those which serve a legitimate purpose release gum, candy, peanuts, postage stamps, cigars and other small articles, and thus a customer automatically serves himself. Automatic restaurants on this principle came into vogue in 1916. Another type of slot machine automatically delivers a specified amount of gas, according to value of the coin deposited, to the pipes and burners to which the machine is attached. There is yet another variety, which operated to show a series of stereopticon pictures, but since the advent of moving pictures it has lost its vogue. A variation of this form included a phonograph which produced songs when a coin started the mechanism. The "nickel telephone," in which a five-cent piece automatically sounds a warning to the operator, is possibly the most useful development of the slot machine for business purposes. The greater number of city telephones are of this type.

Other slot machines are gambling devices, the most common of which consists of a wheel which is set in motion by the dropping of a coin. The gambler endeavors to win money by selecting one of the many symbols on the wheel; he wins if the pointer, after spinning, stops above the selected symbol. The gambling devices are many and various; in most states and provinces they have been condemned as unlawful, but owing to lack of unity of action they are still extensively used. The pleasure boats that sail the Great Lakes and from ocean ports for cruises along the shore, although fitted with gambling devices, are compelled by state law to allow no gambling within three miles from shore, where local authority ends and national jurisdiction begins. F.ST.A.

**SLO'VAKS,** a Slav people living in the new Czecho-Slovakia and in scattered settlements in adjoining districts. They probably occupied this territory as early as the fifth or sixth century A. D. They are for the most part peasant people who cultivate their farms in the most primitive manner. Many of them also wander about as laborers or tinkers. Because of oppression by the Magyars (which see), who treat the Slovaks as inferiors, large numbers of them have migrated to America. They are lovers of music, and their songs are popular among other peoples. Before the War of the Nations there were about 2,500,000 Slovaks in Europe. See CZECHO-SLOVAKIA.

**SLOYD,** *sloid,* a system of handwork originating in Sweden in 1872 and introduced into the United States soon afterwards, where it is taught as manual training (which see). The word *sloyd* is the English form of the Swedish word *slog,* meaning *skill of hand.*

**SLUG,** the name of a group of animals belonging to the Mollusca branch (see MOLLUSKS) and resembling the snails in structure and habits. They are slimy-looking creatures, lacking the external shell of the snails, but, like them,

GIANT YELLOW SLUG
About natural size.

having their eyes borne on tentacles. There are two pairs of these stalks, the eyes being on the tips of the larger ones. While the slug is slowly crawling along it secretes a slimy substance that makes locomotion easier. In the vicinity of New York and Boston there is found a garden slug that feeds especially on greenhouse plants. This is the *great gray slug,* native to Europe and introduced from there into the United States. These slugs are inclined to seek heaps of refuse and decaying matter, and they can be held in check if such accumulations are kept out of gardens and hothouses. Another species is the *giant yellow slug* of California. Some florists sprinkle ashes and cinders about plants they wish to protect, as the slug that crawls over these rough, dry objects has to secrete so much mucus that it dies of exhaustion and suffocation. See SNAIL.

**SMALL ARMS,** a term which embraces firearms held and fired by hand, as distinguished from artillery and machine guns. Gunpowder soon after its invention was applied to use in cannon, and later to hand arms, the first patterns of which, however, were so heavy that two men were required to carry, load and fire a gun. It was slow in firing and pattern after pattern has given place to improvements, until the modern, easily-carried and effective weapons have been evolved.

On the arrival of the early colonists in America they were, of course, provided with weapons of European make. Germany, Switzerland and France had made considerable progress in the production of firearms, and imported weapons were used in America for many years. Until the period of the Revolutionary War, in fact, weapons of old style were still in use, for the training of the early colonists had taught them to condemn the use of firearms except to obtain food or for purposes of self-defense, and they had remained satisfied with their primitive weapons.

The first rifles produced in America were cumbersome weapons of German pattern, with deeply rifled barrels, which were so hard to load that the bullet had to be driven in with a mallet. They were far more accurate in shooting, however, than those previously in use. The total weight of these rifles was about ten pounds, and the barrel measured forty to forty-five inches. In the western sections a rifle specially adapted to buffalo hunting was used, the barrel measuring thirty-four inches, firing ninety grains of powder and having a bore of over one-half inch. The rifle most suited to early use in the United States was found to be one of small bore, especially for shooting squirrels, turkeys and small game of that section. The bullets used were small, about seventy or eighty weighing a pound.

During the War of Secession about 7,000,000 rifles of different kinds were used by the contending armies, some imported, some made in arsenals already established in America. The first breech-loading rifle to be made by the government was the Hall rifle issued in 1818, though muzzle-loading muskets were used till some years later. After the War of Secession muzzle-loaders were transformed into breech-loaders. The introduction of center-fire cartridges, a great improvement on the old powder-and-ball charge, led to a great advance in the production of firearms. The breech-loaders, converted on plans suggested by a mechanic at the Springfield (Mass.) armory, fired a cartridge of .58 caliber, a brass shell containing seventy grains of powder and 450 grains of lead. The caliber of the rifle named the Springfield was reduced in 1873 to .45, with seventy grains of powder and 405 grains of lead.

The introduction of smokeless powder led to still further improvements. The advantages of the new explosive were obvious. Vast quantities of smokeless ammunition were made during the Spanish-American War for use in the Springfield rifle of .45 caliber. The caliber was further reduced when the Krag-Jorgensen rifle was adopted in 1892, with .30 caliber. The Springfield rifle of later pattern (1900) also has a caliber of .30, is fitted with a magazine, and in the hands of an expert is capable of firing twenty shots in 28¾ seconds.

Rifles for hunting purposes have kept pace with the improvements effected in military weapons. Smokeless powder at once found universal favor among hunters, and a jacketed bullet, that is, a bullet with a lead core, has been found the most effective. On striking game this bullet expands and inflicts a terrible wound. The Winchester repeating rifle with a .405 caliber, used by sportsmen throughout the world, fires a cartridge containing a 300-grain bullet with a charge developing a muzzle velocity of 2,204 feet per second. Shooting with the many different makes of revolvers has also greatly improved since the general use of smokeless powder, which does not readily foul the barrel. During recent years the revolver has been partially superseded by automatic pistols, of which there are many patterns using smokeless powder and steel-covered bullets. Numerous small-bore rifles are popular, the .22 caliber repeater being an excellent weapon for hunting small game. F.ST.A.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Blunderbuss | Revolver |
| Bullet | Rifle |
| Cartridge | Shotgun |
| Musket | Smokeless Powder |

**SMALL'POX,** one of the most contagious diseases known. Formerly epidemics of smallpox carried off thousands of victims, but its ravages are now checked by vaccination, which is an almost certain preventive of the disease in severe form (see VACCINATION). Unlike many diseases, smallpox spares none, for tiny babies and aged persons are alike susceptible to it. The typical symptom is an eruption of the skin that sometimes leaves the victim with permanent scars, called pockmarks.

About twelve days after exposure the patient feels the first symptoms—severe chill, pains in the back, limbs and head, and nausea, with temperature rising to 103° F. or higher. On the third day small, red pimples, which feel like bits of shot, appear on the face, spreading rapidly to the other parts of the body. In some cases a preliminary rash appears on the second day, but it fades away before the true eruption breaks out. On about the sixth day the pimples fill with matter, and a depression appears on the center of each. In the interval between the first rise in temperature and the formation of pus the temperature falls practically to normal, but there is a high fever from the time the ulcers appear until the rash dries up. This period lasts about a week and is marked by headache and sleeplessness and in some instances by delirium.

Treatment is directed chiefly toward keeping down the temperature, relieving pain, and preventing infection of the eyes and disfigurement of the face. Permanent scars, however, cannot be prevented if the ulcers reach the true skin. Various methods are employed to avoid pitting, such as keeping the face covered with lint soaked in an antiseptic preparation, and protecting it from the light. No specific drug is known which has definite curative effects, but the disease is kept in check in all civilized countries by means of vaccination and sanitary measures. C.B.B.

**SMELL,** the special sense which enables one to distinguish odors. The sensation of smell results when the *olfactory lobes* of the brain are stimulated, but one always thinks of the nose rather than the brain in this connection (see NOSE). Both are essential, for the brain contains the smell center, while the nose contains the cells in which the nerves of smell terminate. These olfactory cells are distributed through the mucous membrane in the upper part of the nasal cavities. They end on the surface in tufts of hairlike processes that are stimulated by odorous gases drawn up through the nostrils. The nerves leading from the cells transmit the impulse to the brain center, and it is there registered as an odor. Only those substances which are in the form of a vapor or a gas can give off odor. When we sample a fragrant toilet water we really smell the vapor arising from it. Air must pass through the nostrils before an odor can be perceived, so a person in smelling a substance "sniffs" to draw air into the upper part of the nose.

The sense of smell is diminished when one has a cold, because the nerve endings are covered with too much mucus. The victim of a cold often complains that he cannot taste anything or that all foods taste the same. This is because taste and smell are very closely related. In fact, the enjoyment of many foods comes from the fact that they stimulate the sense of smell. While the sense of smell is very delicate, it is not of long duration. Most people can detect the odor of camphor when it is diluted in the proportion of 1 to 400,000, and one drop of strong perfume will scent the air of an entire room. At the same time, persons remaining in the room would soon cease to be aware of the odor, though it would be perceptible to one on entering. The sense of smell

enables one to detect spoiled food and bad air, and in this it serves a very useful purpose. Many of the lower animals have a much keener sense of smell than human beings, and it is this faculty that makes dogs of such value in tracking game. C.B.B.

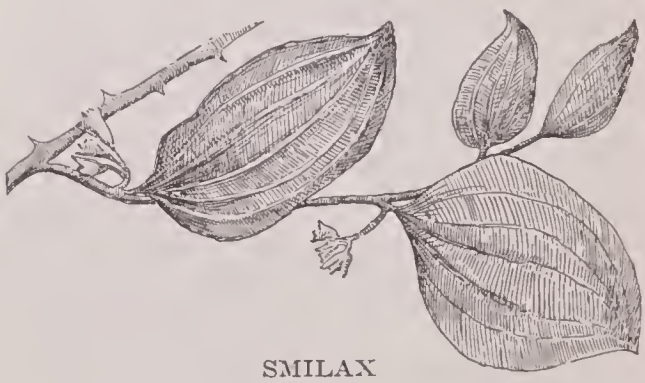
**SMELL'ING SALTS,** ammonium carbonate drenched in perfume for use as a restorative, for headaches and to relieve nasal catarrh. It is only the pungent fumes of ammonia that are effective. Some of the perfumes used are oils of lavender, lemon, cloves, bergamot and pimento. These preparations are often put up in very ornamental bottles.

**SMELT,** a genus of fish, closely related to the salmon and prized as food because of the delicate flesh. The common American smelt occurs along the Atlantic coast from the Gulf of Saint Lawrence to Virginia, and is found in various northern lakes. In the winter it enters streams for the purpose of spawning, and then is caught in large numbers through holes in the ice. Smelt are often marketed after being frozen, but the unfrozen, or "green," fish are considered the greater delicacy. The body is a transparent greenish above and silvery on the sides; the average length is eight or ten inches. Large specimens are over a foot long and weigh about a pound. A similar species is found on the Pacific coast, from San Francisco north to Bristol Bay, Alaska. The annual catch in the United States, amounting to about 4,000,000 pounds, is valued at $175,000. About 10,000,000 pounds, worth $900,000, are caught in Canada.

**SMET,** Peter John de (1801-1872), a Jesuit missionary to the Indians of the Mississippi Valley, was born at Termonde, in Belgium, and educated at Mechlin. He sailed to the United States in 1821, taught in an Indian school at Florisant, Mo., and later in the newly-established University of Saint Louis, and in 1838, having been ordained a priest, began his work among the Indians. Many of the tribes in the great valleys of the Missouri, Yellowstone and Platte rivers knew him and felt his influence—the Potawatomi, Flatheads, Sioux, Blackfeet and Pend d'Oreilles; for he traveled scores of thousands of miles among them, on foot, on horseback or by canoe. Several times he visited Europe, where he raised large sums to promote his work, and induced other missionaries to join him. His published works include *Letters and Sketches of a Residence in the Rocky Mountains,* also *Western Missions and Missionaries* and *New Indian Sketches.*

**SMETANA,** *sma tah'na,* Friedrich (1824-1884), a pianist and composer, was born at Leitomischl, Bohemia. He began the study of music at so early an age that he could not remember the time, and had progressed so far that when six years old he was giving public concerts. He studied at Prague and at Leipzig, where he became intimate with Schumann and Mendelssohn. When scarcely twenty-one he was made concert-master by Emperor Ferdinand of Bohemia, and during the next twelve years was busy not only with this work, but also with the directing of a music school founded by him at Prague. For some years he was conductor of the Philharmonic Society of Gothenburg, Sweden, but in 1866 returned to Prague, where the remainder of his life was spent. In 1874 he lost his hearing; this misfortune so preyed upon his mind that on his sixtieth birthday he lost his reason and spent his last days in an asylum. Among his best works are the operas, *Braut* and *Dalibor,* and the well-known string quartette, *From My Life.*

**SMILAX,** *smi'laks,* a group of useful, vine-like plants of the lily family, containing about 200 species, growing in temperate and tropical regions. The graceful hothouse plant of this name, so largely used for decorative purposes,



SMILAX

is a native of the Cape of Good Hope, and is not a true smilax. Familiar American species are the carrion flower and the greenbrier. Almost all of the species of true smilax are woody vines, with hardy, tuberous roots, evergreen leaves veined from tip to base, and stems which end in tendrils by which the plant climbs. Several tropical varieties furnish sarsaparilla, and from the leaves of others a sweet tea is made. The pliant stems of certain kinds are worked into baskets, and in some of the Southern states they make beer from smilax roots and also fatten hogs on them.

**SMILES,** Samuel (1812-1904), a Scottish writer, born at Haddington. Prepared at Edinburgh for the medical profession, he practiced

at Haddington and at Leeds, where he later became editor of the *Times*. During a considerable period of his life he held railway secretaryships. His writings deal with a variety of subjects, but those which have been most read are didactic works, with a strong moral purpose. Among these are *Self Help, Character, Thrift* and *Duty*. His other writings include *Lives of the Engineers; Industrial Biography;* and *The Huguenots, Their Settlements, Churches and Industries in England and Ireland.*

**SMITH,** Adam (1723-1790), a British economist and founder of the science known as *political economy,* or *economics,* was born at Kirkcaldy, Scotland. He was educated in the University of Glasgow and Oxford University and in his twenty-fifth year went to Edinburgh. There he gained considerable notice as a lecturer on literature and philosophy. In 1751 he was appointed professor of logic and ethics in the University of Glasgow and in that position spent twelve happy years. At the end of that period he resigned to become the traveling companion and teacher of the Duke of Buccleuch, and remained abroad for the next three years. After 1776 he spent most of his time at Kirkcaldy in the study of economic and sociological subjects.

His famous and truly great book, *The Wealth of Nations,* appeared in 1776, and is considered the first systematic treatise on political economy. All subsequent study of the subject has followed the general plan and principles set forth in this work. In 1787 Smith was elected Lord Rector of the University of Glasgow, an honor which he declared made him "supremely happy." He died at Edinburgh on July 17, 1790.

*The Wealth of Nations* set an admirable example for economic students by its keen observation of actual facts and its drawing of general principles from these instead of from preconceived theories. In the opinion of present-day economists the book is frequently in error, but its value as a guide and inspiration to investigators and students of economic conditions can hardly be overestimated.

**SMITH,** Edmund Kirby (1824-1893), an American soldier, one of the most fearless Confederate officers in the War of Secession. He was born at Saint Augustine, Fla., was graduated at West Point in 1845, and served with distinction in the Mexican War, being twice brevetted for gallantry, at Cerro Gordo and at Contreras. From 1849 to 1852 he taught mathematics at West Point, and in 1855 was appointed captain of cavalry. On the secession of Florida he resigned his commission in the United States army, and in 1861 became a brigadier-general in the Confederate service. He served under Joseph E. Johnston and led the advance of Bragg's army in the Kentucky campaign. In 1863 Smith was given command of the Confederate forces west of the Mississippi, and in 1864 he defeated General Banks in the latter's Red River expedition. His forces were the last to surrender at the close of the war (May, 1865). General Smith became interested in commercial enterprises after the war, and from 1866 to 1868 was president of the Atlantic and Pacific Telegraph Company. In 1870 he was appointed chancellor of the University of Nashville, remaining there until 1875. From 1875 until he died he was professor of mathematics in the University of the South at Suwanee, Tenn.

**SMITH,** Francis Hopkinson (1838-1915), a versatile American author, architect, artist and engineer, was born at Baltimore. He was educated for civil engineering and attained success as a designer and builder of lighthouses, sea walls and other large masonry works. He built the foundation for the Statue of Liberty, in New York harbor. His avocations, painting and literature, have made him more famous than his vocations. He has been awarded numerous medals for landscapes in water colors and charcoal drawings; as a writer he shows his training as an artist, for his descriptions are delightful in their sureness and delicacy of touch, while the atmosphere created in each story is not unlike that which hovers about a picture of merit.

F. HOPKINSON SMITH

In *Colonel Carter of Cartersville* he probably reached his greatest literary success, but *A Gentleman Vagabond, Caleb West, The Under Dog, Colonel Carter's Christmas, Tom Grogan* and others have an almost equal charm in characterization, quaint humor and local color. These stories possess much dramatic character; *Colonel Carter of Cartersville* was put into the form of a play, with very few changes, by

Augustus Thomas, and was highly popular. Smith's ability to observe and describe minute details adds to the vividness of his sketches and stories and gives them an air of probability that is delightful.

**SMITH,** Goldwin (1823-1910), a man of letters whose writings on history and on the affairs of the day spread his fame wherever English is spoken. He was born at Reading, in Berkshire, England, was educated at Eton and at Magdalen College, Oxford, and in 1847 was called to the bar. He made no attempt to practice law, but during and after his years as professor of modern history at Oxford (1858-1866) devoted much attention to journalism. In 1864 he delivered a series of lectures in the United States, and in 1868 removed to that country and accepted a position as professor of English and constitutional history at the newly-organized Cornell University, Ithaca, N. Y. Three years later he resigned his professorship, and after that time made his home in Toronto, Ontario, and is therefore considered a Canadian.

GOLDWIN SMITH

Smith contributed to the chief English and American papers, and in Toronto founded *The Canadian Monthly, The Nation* and *The Week.* Everything that came from his pen commanded an interested audience, not only because of the sound knowledge on which it was based, but also because of his unusual skill in the use of language. His historical writings, which include *Irish History and Irish Character, A Short History of England down to the Reformation,* and *Irish History and the Irish Question,* are marked with extraordinary vividness, and show, moreover, sound historical judgment, though they often roused the opposition of politicians. He stirred up much antagonism, also, by strenuously advocating the union of Canada with the United States, not only commercially, but politically.

His writings were very numerous; in addition to those noted above, the following may be mentioned: *My Memory of Gladstone, In Quest of Light, Guesses at the Riddle of Existence, The Founder of Christendom* and *Labor and Capital.* What he wrote in connection with the industrial situation as he viewed it was the reflection of personal work he undertook to bring about more cordial relations between the various elements of society. A.McC.

**SMITH,** Hoke (1855- ), American journalist and political leader, born in North Carolina and educated in a private school conducted by his father. In 1872 he removed to Georgia. In the next year, even though only eighteen years old, he was admitted to the bar. He became a leader in his profession and also found time to make the *Atlanta Journal,* which he owned from 1887 to 1898, one of the leading newspapers of the South. His first activity in politics was as delegate to the Democratic state convention of 1882; he was Secretary of the Interior from 1893 to 1896, in Cleveland's Cabinet, and was governor of Georgia from 1907 to 1909. He was reëlected governor in 1911, but resigned after a few months to become United States Senator. He was reëlected in 1914 for the term ending March 4, 1921.

**SMITH,** John (1580-1631), a famous leader of the English settlers of Virginia in 1607, was born at Willoughby, Lincolnshire, England. His adventures as told by himself are marvelous, and cannot be credited entirely. As a soldier of fortune serving in the Protestant wars against the Saracens he states that he killed three gigantic Turks in single combat in Transylvania, and thereby received his coat-of-arms, emblazoned with three Turks' heads. Taken prisoner in the Battle of Rothenthurm, he claims to have been sold as a slave and given to a Turkish lady, who fell in love with him, but desiring freedom above all else, he killed his overseer and made his escape, eventually reaching England.

It is a matter of record that in 1606 he sailed as an ordinary colonist in the expedition to Virginia, but showed such ability that soon after the settlement of Jamestown he became executive head and ruled so firmly that order quickly succeeded confusion. Captured by Powhatan in December, 1607, he declared he was saved by the Indian girl, Pocahontas, who threw her body on his when the executioner's ax was about to fall. He was so badly wounded by an explosion of gunpowder in 1609 that he was compelled to return to England. In 1614 and 1615 he explored the New England coast, made fairly accurate maps and wrote interesting descriptions of what he saw, and for this service received the title "Admiral of New England."

"A restless, vain, ambitious, overbearing, blustering fellow, who made all men either his hot friends or his hot enemies," one biographer says of him; he nevertheless belonged to the sane and wholesome class of men that can plan and can do. His *True Relation of Virginia, Description of New England* and *The Summer Isles* are vigorously written and possess true

CAPTAIN JOHN SMITH
From an old painting.

historical and geographical value. Smith was a man of great energy and versatility, and will always hold a high place as one of the founders of American civilization. E.D.F.

Consult Bradley's *Captain John Smith;* Jenks' *Captain John Smith.*

**Related Subjects.** The following articles in these volumes will explain the references in the above discussion of John Smith, and will give further information:

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|---|---|
| Jamestown | Saracens |
| Pocahontas | Virginia, subhead |
| Powhatan | *History* |

**SMITH,** Joseph (1805-1844), the founder of the Church of Jesus Christ of Latter Day Saints, more commonly known as the Mormons, was born at Sharon, Vt. Early in life he showed those hereditary tendencies that had so large a part in shaping his career, for both his parents and grandparents were believers in heavenly visions and miraculous cures. The Smith family moved to Manchester, near Palmyra, N. Y., in 1819, and the boy began work as a farm laborer. In 1820, during a season of religious revival, he received, according to his own account, a vision directing him not to join any existing religious sect, but to await spiritual guidance as to his future. This was the first of the series of visions which were the inspiration of the *Book of Mormon* and out of which developed the great Church now centered at Salt Lake City, Utah.

JOSEPH SMITH
The founder of the Mormon Church.

In these visions he was told where he would find buried a number of gold plates, upon which were inscribed "the fullness of the everlasting gospel." He was told, as he himself said, to dig in a mound four miles from Palmyra, and there he claimed to have found the plates. These he translated from the "reformed Egyptian," in which he said they were written. He did this work shielded behind a thick curtain. The information they contained, which is embodied in the *Book of Mormon,* he made the foundation of his new Church. This sect, which he named the Church of Jesus Christ of Latter Day Saints, or the Mormon Church, was organized in 1830 at Fayette, N. Y. Smith claimed to have received the priesthood of Aaron from John the Baptist, and the priesthood of Melchizedek from Peter, James and John. His followers quickly recognized him as a prophet, and, as the religious unrest of the times was favorable to the founding of a new sect, he soon was the leader of a very considerable number of Mormon believers.

Shortly after the organization of the Church at Fayette, Smith sent out a number of missionaries. Among their first converts was Sidney Rigdon, then pastor of a church of the Disciples of Christ in Mentor, Ohio. Rigdon at once became a Mormon leader, and in 1831 accompanied Smith to Kirtland, Ohio, where

he gave valuable assistance to his leader in establishing the new sect. There a general store, a steam sawmill and a tannery were soon being operated by them; land was bought and a great city platted, and in 1836 they consecrated a stone temple. Another of the early converts was Brigham Young, who joined Smith at Kirtland in 1832, and whose qualities of leadership, persuasive eloquence and practical sense were destined to exert a powerful influence on the history of the Church.

Difficulties beset the community at Kirtland from the beginning. There were persecutions from without and dissensions within the body, and an attempt to depose Smith was thwarted only by the determined opposition of Young and Rigdon. Nevertheless, before the settlement broke up, most of the details of the Church organization were worked out. During the years at Kirtland, Smith, with untiring zeal, was sending out missionaries and attempting to spread his doctrines in the states farther west. Mormon emigration to Missouri had begun as early as 1830, and in 1838, when the settlers in Kirtland were driven out, Smith and Rigdon fled to a new settlement called Far West (now Kerr), in Caldwell County, Mo. There the Mormons were in conflict with the native Missourians from the beginning, and Far West soon surrendered to a force of state militia.

The scene of Smith's activities was then removed to Nauvoo, Ill., where a numerous body of his followers was already encamped. In December, 1840, the state legislature granted them a charter giving Smith nearly unlimited civil authority. The city grew rapidly, a university was established, and in 1841 the foundation of their new temple was laid. Yet the fair outlook in the new and beautiful settlement was not destined to fulfil its promise. Smith aroused enmity here, as elsewhere, because of his clashes with civil authority. Furthermore, it became rumored that he had a revelation establishing and approving polygamy, which aroused indignation throughout the community. A newspaper was established to oppose him, the editors of which were driven out of the city. In 1844 there was a general uprising against the Mormons, and Smith put Nauvoo under martial law.

At this critical period his most efficient lieutenant, Brigham Young, was away on a gospel mission to the Eastern states, and the Mormon leader found the tide too strong for him. Arrested on the charge of treason, Joseph and Hyrum Smith (a brother) and others were placed in the jail at Carthage on June 25. On the night of the 27th a mob, aided by the militia guard, broke into the prison and shot the two brothers. M.M.B.

**Related Subjects.** In connection with this study of Joseph Smith, the reader will find the following articles of interest:

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| Latter Day Saints | Salt Lake City |
| Mormons | Utah |
| Polygamy | Young, Brigham |

**SMITH,** Samuel Francis (1809-1895), an American poet and clergyman, born at Boston. He graduated from Harvard in 1829 in the same class with Oliver Wendell Holmes and James Freeman Clarke, and pursued further study in Andover Theological Seminary. He was ordained in the Baptist ministry in 1834, and in that year became pastor of a church at Waterville, Me., and professor of modern languages in Waterville College. He was a pastor at Newton, Mass., from 1842 to 1854, at the same time edited *The Christian Review,* published at Boston, and took an active part in preparing the publications of the American Baptist Missionary Union. At length he devoted most of his time to the work of this Union, and made two trips around the world investigating its numerous stations.

His fame rests upon his authorship of *America,* first sung in Park Street Church, Boston, July 4, 1832; but he wrote a large number of other well-known hymns, among them *The Morning Light is Breaking.* He was author of several books on missionary topics, such as *Missionary Sketches* and *Rambles in Mission Fields,* but is remembered to-day almost solely for the poem which is popularly, but not legally, the national anthem of the United States. For the details of the origin of *America,* see the article under that title.

**SMITH,** Sydney (1771-1845), an English clergyman and humorist, born at Woodford, Essex. He graduated from New College, Oxford, where he was later given a fellowship, and in 1794 he became curate of Nether Avon, on the Salisbury Plain. Four years later he removed to Edinburgh, where he engaged in preaching and tutoring, and where he aided Brougham, Jeffrey and other men of eminence to establish the Edinburgh *Review.* To this periodical he continued to contribute for twenty-five years. In 1804 he began in London a series of lectures on moral philosophy which were brought to an end in 1806 when he became rector of Foston-le-Clay in Yorkshire. After twenty-two years of service here he was

presented with the more desirable rectory of Combe-Florey, and from 1831 until his death he was connected with Saint Paul's, London.

Notable among his writings are the *Letters on the Subject of the Catholics,* which helped to secure Roman Catholic emancipation. Smith's humor is powerful, yet always good-natured. The following quotations will give some slight idea of his manner and the whimsical quality of his humor:

Looked as if she had walked straight out of the Ark.

My living in Yorkshire was so far out of the way, that it was actually twelve miles from a lemon.

It is not more than a week ago that I heard him speak disrespectfully of the equator.

**SMITH COLLEGE,** a prominent college for women, founded at Northampton, Mass., by Miss Sophia Smith. It received a charter in 1871, and class sessions began in 1875. The annual student enrolment at the present time is over 1,800, and the faculty numbers about 165. Smith College gives the usual courses leading to the degree of Bachelor of Arts, and confers also on postgraduate students the degree of Master of Arts. Among the college buildings are the library, with 60,000 volumes, an observatory, a plant house with well-equipped botanical collections, an art gallery and a hall containing an auditorium seating 2,300. The college aids in the support of science work at Naples, and contributes to the support of the classical schools at Rome and at Athens. The buildings and grounds are valued at nearly $2,000,000.

**SMITHS FALLS,** a town in Lanark County, Ontario. It is situated on the Rideau Canal, on the Canadian Northern Railway and on two lines of the Canadian Pacific Railway. By rail it is twenty-eight miles northwest of Brockville, forty-two miles southwest of Ottawa, 128 miles west of Montreal and 212 miles east of Toronto. It is a flourishing manufacturing center, especially noteworthy among its products being agricultural implements, stoves, woolen goods and flour. Smiths Falls has a collegiate institute. Population in 1911, 6,370; in 1916; estimated, 6,600.

**SMITHSO'NIAN INSTITU'TION,** an institution established at Washington, D. C., in 1846 for the "increase and diffusion of knowledge among men," as stated by its founder. It owes its existence to the generous bequest of an Englishman, James Smithson, who left over $515,000 to the United States government for the purpose.

Congress accepted the legacy and established the Institution by an act approved August 16, 1846. The first secretary, Joseph Henry, outlined a broad and general policy of administration, to which later secretaries have adhered (see HENRY, JOSEPH). The Institution has justified the intentions of its founder by encouraging original research in science and literature; by publishing the results of such research, and by promoting a freer interchange of ideas among leading men of science and scholars throughout the world. Subsequent gifts and appropriations of public money have increased the scope of its activity. In addition to a Bu-

SMITHSONIAN INSTITUTION
Founded by a subject of Great Britain who never set foot on American soil.

reau of Exchange, which facilitates intercourse among students in all countries, the Institution comprises a Bureau of American Ethnology, the National Museum (see NATIONAL MUSEUM OF THE UNITED STATES), the Astrophysical Observatory, the Langley Aërodynamical Laboratory and the National Zoölogical Park.

The Institution is legally an establishment having as its members the President of the United States, the Vice-President, the members of the Cabinet, and the Chief Justice; it is governed by a board of regents composed of the Vice-President, the Chief Justice, three members of the Senate, three members of the House of Representatives and six citizens selected by Congress. The Secretary, who is chosen by the regents, is the executive officer.

**James Smithson** (1765-1829), who founded the Institution, was the son of Hugh Smithson, first Duke of Northumberland. He was educated at Oxford, specializing in chemistry and mineralogy, and later achieved considerable distinction and received election as a vice-president of the Royal Society. In regard to his gift to the United States he wrote: "My name shall live in the memory of man when

the titles of the Northumberlands and the Percies are extinct and forgotten." G.B.D.

Consult Rhees' *The Smithsonian Institution: Documents Relative to Its Origin and History.*

**SMOKE,** the visible vapor that arises from a burning substance, especially wood, coal, peat or petroleum. Smoke contains water vapor, carbon dioxide or some other gases, but the visible portion consists of minute particles of unburned carbon that form the soot. When combustion is perfect the smoke is nearly invisible. A great volume of black smoke indicates imperfect combustion and a consequent waste of fuel. Soft coal and crude petroleum produce the largest quantities of soot of any fuels, and in large cities where soft coal is the principal fuel the smoke becomes a nuisance. A scientific investigation of the air about Chicago in 1915 showed that the chimneys of that city threw out 179,511 tons of solid matter in a year. By far the greater part of this matter was soot. Several American cities are making systematic efforts to control the smoke evil, a greater part of which is caused by careless stoking and imperfect draft. Automatic stokers, which feed the fire no faster than fuel is consumed, and properly constructed chimneys and flues are among the best means for preventing smoke. City authorities are now insisting upon these devices. See Soot.

**SMOKE'LESS POW'DER,** a powerful explosive made by combining some form of cellulose with a mixture of sulphuric and nitric acids and then with acetic acid or acetone. The smokeless powder most extensively used is prepared by kneading guncotton (which see) into a paste with acetic acid. It exerts about twice the force of ordinary gunpowder. The powder is smokeless because the products of the explosion are all gaseous, whereas those of gunpowder are fully fifty per cent solid matter.

While the most extensive use of smokeless powder is in the big guns of the artillery and navy, where it has wholly displaced gunpowder, it is also used in smaller firearms, and for blasting under certain conditions. Various grades are manufactured, each being adapted to its purpose. When strong acid is used in its preparation, an explosive of great strength is produced, and a powder of any desired strength can be made by regulating the strength of the acid used in its manufacture.

The history of smokeless powder begins with the discovery of mercuric fulminate in 1800, and of guncotton in 1845. In 1875 the Swedish engineer, Alfred Nobel, made the first preparation, now known as *ballistite.* This is used by the Italian navy. Other preparations in common use are *cordite,* used by the British, *indurite,* used by the United States, and *B. N.,* used by the French.

**Related Subjects.** For a more extended view of this subject the reader is referred to the following articles in these volumes:

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|---|---|
| Acetic Acid | Explosives |
| Ammunition | Guncotton |
| Cellulose | Gunpowder |
| Cordite | |

**SMOLLETT,** *smol'et,* TOBIAS GEORGE (1721-1771), a British novelist born near Dumbarton, Scotland. After receiving a grammar school education he was sent to the University of Glasgow to study medicine and was later apprenticed to a surgeon of Glasgow. However, he was more interested in the profession of literature than in that of surgery, and by 1739 had produced a tragedy, *The Regicide.* Having tried unsuccessfully in London to secure the acceptance of this play, he embarked as surgeon's mate on the *Cumberland,* which was about to join Admiral Vernon's expedition against Cartagena (1740). After his return to London he left the navy and again attempted literary production. In 1748 appeared the first of his noted works, the novel *Roderick Random,* which is a story based largely upon his experiences at sea. It became immediately popular. Of his later works the most noteworthy are *Peregrine Pickle* and *Humphrey Clinker.* These novels, as well as *Roderick Random,* depend for attractiveness upon amusing and thrilling incidents; they are not carefully constructed and the character portrayal attempted is somewhat superficial. Smollett was for a time editor of the *Critical Review* and later of the *Briton,* both of which were Tory periodicals.

**SMUGGLING,** *smug'ling,* the practice of taking into a country dutiable merchandise without paying the customs duties. All countries which impose customs duties have stationed at their ports of entry and at points on the borders of countries adjoining them certain officers whose duty it is to examine both personal baggage and shipments of merchandise, to see that the goods are not undervalued and that the regular duties are paid. Violators of the laws respecting customs are punished by fine, imprisonment or forfeiture of goods, according to the magnitude of the offense. The term refers also to the practice of bringing into a country an article whose importation is prohibited by law.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Customs Duties | Port of Entry |
| Free Ports | Protection |
| Free Trade | Revenue-Cutter Service |

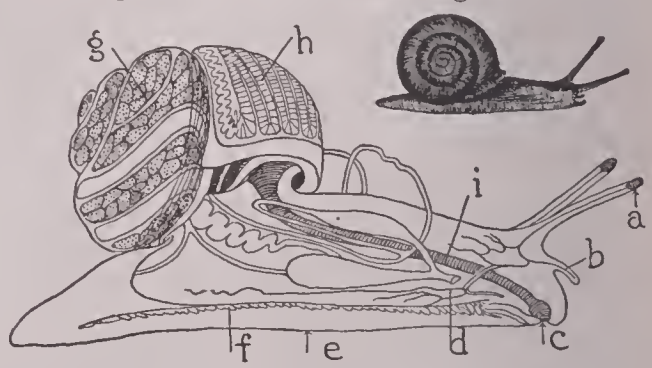

**SMUTS,** minute plants (fungi) which live in certain other plants as parasites. Smuts attack wheat, oats, barley and corn and cause great damage to crops every year. The black dust, or smut, consists of the millions of spores given off by the ripened fungi. These lodge on other plants, penetrate to the interior and begin their growth to produce another crop of spores. The smuts which attack wheat, oats and barley are in the seed, and in most cases the spores can be killed by treating the seed before planting. Soaking wheat in a solution of one pound of copper sulphate to a gallon of water for five or six minutes will destroy the spores of wheat smut. Oat smut is destroyed by spreading the seed on a floor and sprinkling it with a solution consisting of one pound (one pint) of formalin to fifty gallons of water. Soaking the seed in hot water is also effective. The temperatures may range from 125° to 135° F.

Corn smut does not get into the seed, so cannot be prevented by any of the methods already described. The spores lodge in the soil and in manure, and attack the young plants, penetrating the stalk and sending fibers into every branch, leaf and flower. In this way the fibers get into the ear, where the fungi mature and burst forth just as the farmer thinks he is to have an abundant crop. The smut, which is of a bluish-black color, appears at the tip of the ear, where the kernels swell to several times their normal size and burst, sending the spores into the air to be blown about by the wind. Smut may also appear in the tassel and the leaves.

Corn smut is prevented with difficulty because the spores may be carried over to the next season in so many ways. Masses of smut are left on the ground and remain in the soil. The spores get into the fodder and then into the manure, where, in the spring, spores which attack the next crop are developed. Rotation of crops is the surest preventive of corn smut, since the spores will not live in the soil over more than one season. Seed from an infected field should not be planted, and all smut-infected ears should be destroyed, if possible, before the spores mature. See FUNGI; BACTERIA AND BACTERIOLOGY. W.F.R.

**SMYRNA,** *smir'na,* the chief seaport of Asiatic Turkey and the capital of the vilayet of Smyrna, is situated on the western coast of Asia Minor, on an arm of the Mediterranean Sea (see map, opposite page 417). It lies about 200 miles southwest of Constantinople, with which it is connected by a line of railway, and is built partly on the slopes of Mount Pagus and partly on the plain below. This interesting city, which is on the site of a Greek colony in existence over seven centuries before Christ, is now famed chiefly as the center of an Oriental rug trade. Smyrna rugs are made in various small villages in the vicinity. The city has an excellent harbor and a modern quay, and in normal years exports great quantities of figs, raisins, sponges, silk goods, rugs, hides and grain. There are five distinct sections to the city, the Mohammedan, the Jewish, the Armenian, the Greek and the European. Fine churches, schools, hotels and shops give the European quarter the aspect of a modern city, and the Armenian and Greek sections are of a similar character. The population of the place is estimated to be 350,000; over one-half of the people are Greeks. Smyrna was bombarded by an allied fleet during the War of the Nations, but was not captured.

**SNAIL,** *snayl,* a group of mollusks inhabiting both land and water, and distinguished by having a spirally-coiled shell attached to the soft body (see MOLLUSKS). A snail, when it desires protection or wishes to go into winter




PARTS OF A SNAIL

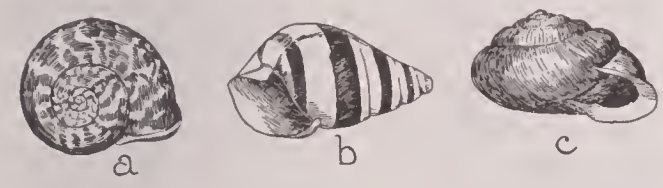
(*a*) Eye; (*b*) tentacle; (*c*) mouth; (*d*) nerve ganglia; (*e*) foot; (*f*) mucous gland; (*g*) liver; (*h*) lung; (*i*) aesophagus. The upper illustration shows the snail in its natural position.

quarters, withdraws the entire body into the shell, as the attaching membrane is a muscular process. This shell, which consists of but one valve, is often called the "house of the snail." This covering is secreted by the skin of the animal, and is composed of a limy substance. At first the shell is soft and pliable, but it becomes harder as the animal grows to maturity. Charles Lamb once wrote—

> The frugal snail, with forecast of repose,
> Carries his house with him where'er he goes.

Snails move so deliberately that the expression "slow as a snail" has become proverbial.

The typical land snails are found in warm, damp places in fields and woodlands; they especially like a situation under a fallen log or in a mossy tree stump. Their organ of locomotion is a so-called foot, a long, muscular projection extending from the shell. By contractions of this organ the snail slowly crawls along, its progress being aided by the secretion of a slimy mucus. One of these creatures can be trailed by the slimy track it leaves behind it. On the forward end of the foot is a head bearing two pairs of tentacles, or horns, and on the upper pair of tentacles are the tiny, black eyes, capable of seeing in all directions. The lower pair of horns constitute the organs of




LAND SNAIL SHELLS

(*a*) Common Philippine variety; (*b*) colored shell from Florida; (*c*) the most common shell found in America.

touch. The mouth is provided with a peculiar, ribbonlike tongue, which is covered with numerous tiny, hard teeth. Though snails are fond of leaves and other vegetable matter, some are flesh eaters. In many places in Southern Europe these animals are used as food, and in France they are fattened for the market in snaileries.

**SNAKE,** the general name of the largest order of the reptile group, which includes also lizards, turtles, tortoises, alligators and crocodiles. Though the majority of snakes are harmless, and many of them perform a useful service by killing and devouring insects, mice and gophers and other farm pests, most people regard the snake tribe as the most repulsive in the entire animal kingdom. This prejudice against these creatures is too deep-rooted to be argued away. It existed in early Bible times, for in the story of the Garden of Eden a serpent is taken as the symbol of the Evil One, and a curse was pronounced upon it (see *Genesis* III, 14—"Dust shalt thou eat all the days of thy life"). Eating dust is the picturesque Bible way of saying that snakes have no legs. With the exception of a few species possessing rudimentary hind legs, the serpents are entirely lacking in the ordinary means of locomotion, but crawl by special movements of the ribs and scales.

The body is regularly cylindrical and has no distinct divisions of head, trunk and tail. Contrary to the belief of many, it is not slimy, but is covered with dry scales, which are folds in the skin. There are no external ears and no eyelids. The sense of hearing is made possible by an internal auditory mechanism, and the eyes are protected by a transparent cap that is shed with the skin. Like the Evil One, of which it is the type, the snake sleeps with its eyes open. The tongue is long, slender and forked. It is the animal's best organ of touch, and is thrust out when it wishes to ascertain its whereabouts. The teeth, which curve backward, are sharp and pointed, and are used in seizing food but not for chewing, as the prey is swallowed whole. Poisonous species have, in addition to the ordinary teeth, perforated fangs through which the poison fluid passes from glands at their base. Snakes can swallow creatures much larger than themselves, as the lower and upper jaws are hinged together in such a manner that the mouth can be widely extended. In addition, the halves of the lower jaw are connected in front by an elastic band, and each side can be pushed forward independently. Sometimes the prey is swallowed alive, but the huge pythons and boas first kill their victims by crushing them.

Snakes range in size from small creatures not over five inches long to the giant anacondas of South America, which grow to be thirty or forty feet in length. There are between 1,500 and 2,000 species, found in practically all parts of the globe except in the polar regions, and occurring most abundantly in the tropics. They live on and under the ground, in fresh and salt water and in trees. Animal life constitutes their chief food, but a few species eat eggs. Some snakes lay eggs and others bring forth their young alive. A characteristic of the serpent tribe is the habit of molting the skin several times a year (see MOLTING). E.B.P.

Consult Ditmar's *Reptiles of the World.*

**Related Subjects.** The most important snakes are described in these volumes under the following headings, and there are illustrations with many of them:

| | |
|---|---|
| Adder | Garter Snake |
| Anaconda | Glass Snake |
| Asp | Milk Snake |
| Black Snake | Moccasin Snake |
| Boa | Python |
| Cobra | Rattlesnake |
| Copperhead | Viper |

**SNAKE DANCE,** a weird ceremonial dance of the Arizona Hopi Indians (see HOPI), in

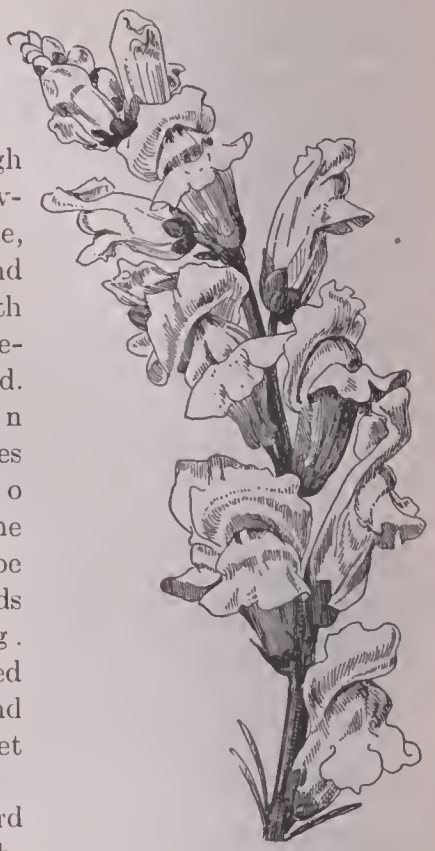
which the dancers, who are members of the Antelope and the Snake priesthoods, carry live snakes in their mouths. Rattlesnakes are principally used, but the reptiles are handled so carefully the dancers are rarely bitten. After the ceremonial the entire village indulges in a feast. The snake dance is held every two years, in August, and is a plea to the powers of nature to send rain.

**SNAKE INDIANS.** See SHOSHONEAN INDIANS.

**SNAKE RIVER,** a river of the Western United States which furnishes an abundance of water power and is beginning to be used for irrigation purposes. It is the largest tributary of the Columbia River, which it joins near Pasco, Wash. Rising high in the Rocky Mountains of Yellowstone Park, the Snake flows in a southwesterly direction to the southern part of Idaho, turns westward and flows across the state nearly to the Oregon line, and then swings abruptly northward. For 170 miles it forms the boundary between Idaho and Oregon, and for about thirty miles flows between Washington and Idaho. At Lewiston it turns westward into Washington. Though the stream is over 900 miles long, its many falls and rapids render it useless for navigation except between the mouth and Lewiston, a distance of 100 miles. The Indians called the river Shoshone, and this name is given to a magnificent cataract near the Idaho-Wyoming boundary.

**SNAKEROOT,** the name applied to a large number of plants, because their roots resemble snakes, or for the reason that they were at one time believed to cure snake bites. They are found quite generally throughout the United States and in many parts of Canada, and their roots in many instances have medicinal value. *Black snakeroot,* or *cohosh,* yields a drug used in treating Saint Vitus's dance; the roots of *Virginia snakeroot,* or *birthwort,* have tonic properties and have been used to cure rattlesnake bites. As a remedy for the latter, however, they have no real value. Another species, *Canada snakeroot,* or *wild ginger,* has stimulating properties and is also used as a spice. From *Senega snakeroot* an emetic is prepared.

**SNAPDRAGON,** *snap'drag un,* a genus of herbs bearing blossoms which, when pressed open and then released, fly shut with a gentle snap. Each flower consists of a tube, at the end of which are two closed lips. When the flower is pressed open it is these lips that snap together. The flowering stalks of the most commonly cultivated species, a native of Europe, grace all old-fashioned gardens and make ornamental borders for large flower beds. The velvety texture and the beautiful and varied colors give the blossoms great charm. The stalks, growing three feet high or more, are covered with fine, short hairs, and the small, smooth leaves are somewhat thickened. The common snapdragon lives from year to year, but some species must be grown from seeds each spring. Seeds are planted indoors early, and the plants are set out in May.



SNAPDRAGON

**SNIPE,** a bird found in freshwater marshes, related to the sandpiper, but differing from it by keeping closely to its cover of grasses and rarely venturing out except at night. The plumage is chiefly a mixture of brown, black and white. The one species found in North America is the *Wilson's snipe,* a bird dear to hunters both on account of its fine flavor and because its erratic flight taxes their skill. The bird is acrobatic in the air, and has a strange habit of "bleating" or "drumming," a sound that it produces by mounting to a great height

THE SNIPE

and then descending by one quick swoop after another, with the air rushing through its wings. Its summer range is from the Northern United States to Hudson Bay and Labrador, and it winters from Illinois and South Carolina southward. Its nest is a depression in the ground on the edge of marshes. The eggs are four in number and their color is olive-brown or grayish-drab, thickly spotted with chocolate.

The *European snipe* is similar to the Wilson's snipe except that it has a longer bill. The *Jacksnipe* is a very small species of the far northern sections of the Old World. South America has several snipes, including the *Giant snipe* of Brazil, a bird which grows to be nineteen inches long.

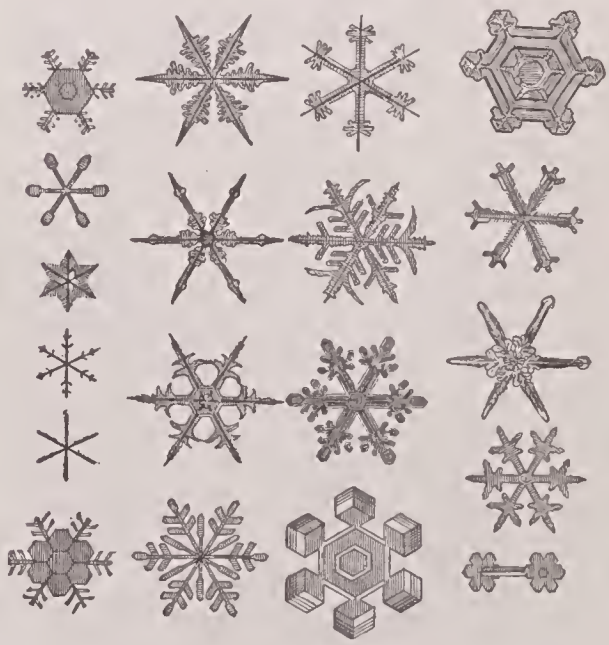
**SNORING,** *snohr'ing.* One can best describe the disagreeable noise made by a person who snores by saying that it sounds much like the word *snore.* The sounds are produced when the sleeper has his mouth open, and when the air, with every breath that is taken, gurgles through the throat with a hoarse, rattling noise. Some people snore simply from habit; the mouth drops open mechanically after one falls asleep. Certain mechanical devices for keeping the mouth closed have been tried, but without encouraging success. Some people advocate the use of a bandage, placed around the head and tied under the chin. When snoring is caused by nasal catarrh or throat trouble, as is often the case, the only remedy is treatment of the ailment. Children who snore should be examined for nose or throat trouble. In their case it is a danger signal that should not be disregarded. See EDUCATION, subtitle *Hygiene of Education,* especially the section on "Adenoids," page 1945.

**SNORRI STURLUSON,** *snor're stoor'loo son* (1179-1241), one of the earliest historians of Iceland, famed as the author of the *Prose Edda* (see EDDA) and of a series of biographies of old Norwegian kings entitled *Heimskringla.* The *Prose Edda,* completed in 1222, is one of the first masterpieces of Scandinavian literature, but was not published until the seventeenth century. Snorri early became prominent as a poet, lawyer and statesman, and in 1215 was made president of the legislative assembly and higher court of Iceland. In 1218 he visited Norway on the invitation of King Haakon, and when he returned home he became a vassal of the Norwegian king and negotiated a peace treaty between Iceland and Norway. After many years he lost the confidence of Haakon, and was put to death by the latter's order.

**SNOW,** *sno,* crystals of ice formed when cloud vapor is condensed at a point below freezing (32° F.). These crystals do not always reach the earth in the form of snow, for sometimes they are partially melted and reach the earth as sleet, and sometimes they are entirely melted and descend as rain. There are millions of boys and girls in the world who never saw a snowflake, for on over a third of the earth's surface snow never falls. Even in some portions of the United States there are children who do not know what snow looks like, who never see it—

> Flying through the cloudy sea
> Out of soft gray mystery,
> Lightly, lightly resting,
> On the old elm nesting,
> Hanging from the hemlock there
> Like a beard of silver hair,
> Molding on the lilac-tree
> Petals of white purity,
> Changing to a lovely frieze
> Ancient weeds forlorn and gray
> Shivering along the way.

Snowflakes are six-rayed ice crystals of different designs, some of which are shown in the accompanying picture. It is interesting to collect some of them on a black surface and to study them under an ordinary magnifying glass.



VARYING FORMS OF SNOWFLAKES

The designs of the flakes vary greatly and are marvelously beautiful. The amount of water in snow is much less than in rain, a rainfall of one inch being equal to a snowfall of about ten inches.

In polar regions and on the tops of high mountains snow falls all the time, whereas in temperate regions it falls during the winter months. The heaviest snowfalls occur in the

mountains of the cool temperate regions, such as the Alps and the Rocky Mountains. These heavy snowfalls have always been a grave danger to travelers through the mountain passes, and in Europe houses of refuge are maintained for the sake of protecting them. The most famous one is that in the Alps at the Saint Bernard Pass. Even twentieth-century travelers, on swift and luxurious trains, are endangered by the winter snows, the snowslides and the avalanches which occur in mountainous regions. The melting of the snow on mountains supplies water for streams and rivers. A.C.

**Related Subjects.** The following articles in these volumes will be of interest in this connection:

| | |
|---|---|
| Avalanche | Ice |
| Crystallization | Snow Line |
| Freezing | Snowplow |
| Glacier | Snowshoe |

**SNOWBALL,** or **GUELDER-ROSE,** *gel'der,* a handsome, flowering shrub that is often seen in parks and on lawns. It is a cultivated form of high-bush cranberry and grows from seven to twelve feet high. The first and more common name refers to the large, ball-like, white flowers, which grow in great profusion. The term *guelder-rose* is derived from the name of the Dutch province of Guelderland, where the plant is supposed to have originated. The flowers of the cultivated plant are all sterile, that is, do not produce fruit, but there is a wild guelder-rose that bears juicy, red berries.

**SNOWBIRD.** See JUNCO.

**SNOW BUNT'ING** or **SNOW FLAKE,** a sparrowlike bird which may be distinguished from all others by the large amount of white in its plumage. Not only on its body, but on its wings and tail as well, white predominates. Except in unusually cold winters, when the snowfall is very heavy, these birds do not venture as far south as the Northern United States, but in Canada they are among the most familiar of winter visitors. Their summers are spent in the Arctic regions. Ernest Thompson Seton says of this bird:

> In midwinter, in the far north, when the thermometer showed thirty degrees below zero and the chill blizzard was blowing on the plains, I have seen this brave little bird gleefully chasing his fellows, and pouring out as he flew his sweet, voluble song with as much spirit as ever skylark has in the sunniest days of June.

**SNOW'DROP,** a group of flowering plants of the amaryllis family, so named because they bear delicate white blossoms that seem to be made out of snow. The common snowdrop of the gardens is one of the hardiest of the out-of-door plants, for it has been known to bloom in mid-winter in localities where a warm spell has caused the surface of the ground to thaw. The snowdrop grows from a small, bulbous root, from which spring two or three narrow green leaves and a leafless flower stalk. The nodding, bell-shaped flowers grow singly at the top of the stalk, and usually come into blossom in northern climes in March or April. The plant is easily cultivated, for the bulbs can be planted in a sheltered place and be left to themselves. The snowdrop needs little attention. In England the peasants call it the *Fair Maid of February.* See AMARYLLIS FAMILY.

Snowdrops that plead for pardon. —SWINBURNE.

**SNOW LEOPARD,** another name for the *ounce* (which see).

**SNOW LINE.** Even in the torrid zone mountains rise into air that is so cold that snow lies on their upper slopes all the year. The lower edge of these permanent snow fields, in whatever country or zone, is called the *snow line.* It is about three miles above sea level in the tropics, approximately two miles above the sea in latitude 40°, and about a mile above sea level in latitude 55° or 60° north or south. It descends to sea level in the frigid zone, where permanent snow may be found even on the lowlands.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Climate | Mountain |
| Irrigation | Snow |

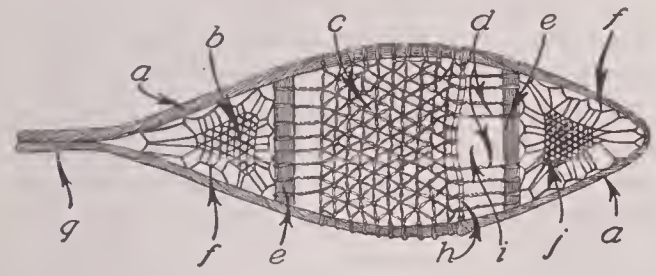
**SNOWPLOW,** a machine for clearing the snow from railways and roads. In the United States and Canada, where the snowdrifts are

of great depth and liable to be packed hard by violent winds, the railroads are usually cleared by a rotary plow, which consists of a wheel nine feet in diameter and provided with a series of knives or scoops. The wheel is kept revolving by a special engine, which is placed with the plow in front of a locomotive. The scoops feed the snow into a hopper, from which it is blown to a considerable distance by a powerful fan. With a rotary plow the deepest drifts can usually be penetrated.

Where the snow is not so deep a triangular plow, with its apex in the center of the track, is used. Pushed forward by a locomotive, the triangle forces the snow off the track at each side. The triangular plow is also used for clearing roads and sidewalks, but cannot be used in any great depth of snow.

The clearing of the railroads of the United States and Canada from snow annually costs many thousands of dollars, but so efficient have modern snowplows proved that drifts that would formerly have entirely suspended traffic can now be cut through with comparative ease.

**SNOWSHOE,** a contrivance to aid in walking on snow, consisting of a light wooden frame, bent in an elongated oval or nearly circular shape, across which is stretched a web made of deerskin thongs, strung much like a




PARTS OF A SNOWSHOE

(*a, a*) Frame, or bow; (*b*) heel filling; (*c*) center filling; (*d*) toe stays; (*e, e*) crossbars; (*f, f*) lanyard; (*g*) tail; (*h*) toe cord; (*i*) toe hole; (*j*) toe filling.

tennis racket (see illustration). Snowshoes provided with supports and holders for the feet, which are protected by moccasins and other wrappings. The principle applied is that of distributing the weight of the body over a wide surface and thus enabling the yielding surface of the snow to support it. Such shoes are used by hunters, trappers, loggers and farmers in countries where the snowfall is deep.

In addition to these practical uses, in the principal cities and towns of Canada there are clubs founded whose members find them a means of recreation for the long winter evenings. The styles of shoes vary according to the use to be made of them and the surface features of the country where used. A nearly round form is known as the *Montagnais,* or mountain shoe. Long and narrow shoes are known as the *Klondyke;* there are all forms between the two. The Indian village of Lorette, ten miles from Quebec, is noted for its manufacture of snowshoes, and Hudson Bay Fur Company manufactures them in large quantities for its trappers. They cost from $2.50 for cheap shoes to much higher prices for finer qualities.

The snowshoe as used in the United States and Canada was originated by the Indians, and the most expert users of them to-day are the half-breed trappers of Eastern Canada. A novice will find it hard to walk even at a slow pace when wearing snowshoes, but expert trappers will walk for hours at a rate of five or six miles an hour on a good, hard-surfaced snow, and many will run at a "dogtrot," covering easily thirty-five or forty miles a day.

In wearing snowshoes care should be taken not to tie the thongs or straps, that fasten the shoe to the foot, too tight. Beginners in the use of snowshoes usually suffer from this cause. The thongs should be crossed over the toes and round the ankles loosely, allowing free play to ankle and instep. On no account should the tightness of the thongs prevent the free rise and fall of the heel. The wearing of snowshoes makes it possible, and easy, to walk across snow-covered areas in which one without them would sink to a depth of five or six feet, a by no means uncommon depth in the woods of Canada. F.ST.A.

**SNUFF,** a fine powder made from the stems and leaves of the tobacco plant, which have been fermented by heat and moisture, then dried and ground. Snuff is inhaled through the nostrils or rubbed on the gums. Various mixtures of flavors or scents are added to make the powder pleasant for inhaling. Formerly it was considered a matter of etiquette to offer "a pinch of snuff" to friends whom one met, for each person carried a snuffbox. This practice is still prevalent in Southern Europe, and many illusions are made to it in literature. Pope says in the *Rape of the Lock*—

> Sir Plume, of amber snuff box justly vain,
> And the nice conduct of a clouded cane.

The habit of taking snuff is very injurious. One of its effects is irritation of the nerves of smell and consequent deterioration of ability to distinguish odors. A user of snuff is deprived of his best protection against foul air. See SMELL.

**SOAP,** *sohp.* During the War of the Nations, which had so marked an effect on the supply of innumerable raw materials, soap advanced in price and deteriorated in quality in many localities, and in some sections in Europe it could not be obtained at all. These conditions were the result of a great scarcity of fats, for fats are the basic materials in soap manufacture. Those generally employed in making this important aid to cleanliness include tallow, lard oil, palm oil, olive oil, cottonseed oil, cocoanut oil, corn oil, stearin and crude oleic acid.

**How Manufactured.** Rosin, or laundry, soaps are made from tallow, which may be mixed with grease or oil. In the course of the manufacturing process rosin is added to give the soap its characteristic yellow color. The fatty material, known technically as *stock,* is poured in a liquid state into a sheet-iron kettle heated by steam coils. During the heating process lye is added to the mixture from time to time, and when the contents have the appearance of a thick gum, saturated salt solution is added until the soap floats on the surface. The mixture is then cooled, and in this process the brine sinks to the bottom of the kettle. The brine is then drawn off and worked for glycerine and salt, while to the soapy layer fresh, strong lye and rosin are added. The resulting mixture is heated until the rosin is thoroughly united with the soap. Then a salt solution is added as before, the lye is drawn off, fresh, strong lye added and the mass boiled again. After further cooling, settling and reheating, and the addition of cold water, the contents of the kettle are allowed to cool off slowly to a temperature of about 65° C.

The soap is next run into a horizontal revolving cylinder, known as the *crutcher,* in which it is stirred until the mixture is of a uniform color and texture. Various chemicals, such as carbonate of soda, are added to improve the quality. Finally the mixture is run into molds where it is allowed to harden into huge cakes. These are cut into bars of market size by steel wires.

Toilet soaps require several other processes, but the crutching operation is omitted. These soaps are usually scented with various ingredients, and they also have different coloring matters added. Cheap, highly scented soaps should be avoided, as the perfume is often added to disguise the presence of offensive fats. As a general rule, a healthy skin is best served by the use of a soap made from pure oil and good soda. Many medicated soaps advertised in the markets are frauds, and the advice of a reliable physician should be sought if one is tempted to try a soap for a skin disorder. Transparent soaps contain alcohol and glycerine, and floating soaps are usually a mixture of tallow and cocoanut oil, potash and soda. Sailors use what is known as *salt-water* soap, made from cocoanut oil, potash, soda lye and salt. The popular Castile soap is made from olive oil and soda or mixed potash. The so-called naphtha soaps usually contain kerosene. O.B.

Consult Deite's *Manual of Soap Making;* Carpenter's *Treatise on the Manufacture of Soaps and Candles, Lubricants and Glycerine.*

**SOAP'STONE.** See STEATITE.

**SOCIAL DEMOCRATS,** *so'shal dem'o krats.* In its widest sense this name is applied to the Socialists of every country whose appeal is international in its scope. Politically, the term applies to the Socialist party of Germany, which was established by Lassalle in 1863 with a very simple program—the demand for universal male suffrage. At the time of Lassalle's death in 1864 the Social Democrats numbered 4,610. The International Union of Workingmen, founded by Marx and Engel in 1864, united with the followers of Lassalle in 1875 to form anew the Social Democratic party as it exists to-day.

So rapid was the spread of the Socialist doctrines that the vote at the first election was nearly half a million and resulted in very severe anti-Socialist legislation under the Bismarck government. In spite of this the vote had increased by 1890 to 1,427,000, by 1903 to 3,008,000, and by 1914 to 4,500,000. The Socialists of Germany now command over a hundred seats in the governing body of Germany, and hold the balance of power. With the opening of the War of the Nations the Social Democrats were split into two factions, those who supported the government in declaring war, and those who repudiated its action. The leader of the antiwar Socialists, Karl Liebknecht, was banished from the Reichstag and silenced for the duration of the conflict.

The Social Democratic Workingmen's party was founded in the United States in 1869. It soon changed its name to the Socialist Labor party, and an offshoot of it became known as the Social Democratic party. The term is little used, however, the Socialist party of America being the popular designation.

See article SOCIALISM, and its list of related topics.

**SOCIALISM**, *so'shal iz'm*, a political world movement which seeks to adjust the relation of the individual to the community by means of collective ownership and management of the principal means of production and distribution.

The term *socialism* seems to have appeared first in England in 1833, in a paper called *The Poor Man's Guardian*, during discussions which arose in regard to an organization called the *Association of All Classes of All Nations*. As this society was for the purpose of social reconstruction, the name was considered well applied. French and German writers recognized the term and it soon came into general use, but it was in Germany that it first acquired political significance. The word has been much abused, having been used to describe communism, anarchism and almost everything of a revolutionary nature in the political world. The only proper use of the word to-day is in its application to one of the most remarkable movements of the nineteenth century, that of the so-called Socialist party, which is the only political party with an international alliance.

**In the United States.** The development of the theory of social evolution and the spread of socialism as a party movement have been rapid in America. In 1888 the Socialist vote in the United States was 2,068, in 1904 it had grown to 442,402; in 1912 it was but little below 1,000,000, but in 1916 it fell to 594,095. In the national headquarters of the Socialist party of the United States in Chicago are maps dotted with colored pinheads showing the location of the local organizations. These pins are as numerous in some of the agricultural states as in the industrial states, showing that the membership is not confined to factory employees.

The best means of determining what are the principles of socialism as held by adherents of the party in the United States is to study the "working program" or platform of the party, which is regarded as a definite pledge to the members.

The working program of 1916 stated that its measures are calculated to strengthen the working people in their efforts to effect a coöperative commonwealth, which is the ultimate aim of the party, and to increase the power of resistance against what is termed capitalistic oppression. The platform is stated under three heads, Collective Ownership, Industrial Demands and Political Demands; with the latter is included Unemployment Demands, seeking to secure government employment for all men out of work.

*Collective Ownership* includes the ownership and management by all its holders of railroads, telegraphs and telephones, express service, steamboat lines, "and all other social means of transportation and communication and of all large-scale industries." It includes the immediate acquirement by the government of such agencies as can be made to reduce the cost of living, as grain elevators, stockyards and storehouses. It asks for government ownership of mines, quarries, oil wells, forests, water power, and the conservation and development of all natural resources for the benefit of the people. The collective ownership and democratic management of the banking and currency system is required; the collective ownership of land wherever practicable, and where not practicable, an appropriation by taxation of the rental value of such land as is held for speculation or for exploitation of any kind.

*The Industrial Demands* are for the better protection of workers and their families. They include the shortening of the work day, in proportion to the increasing productiveness of machinery; the securing to every worker a rest period of at least a day and a half each week; the securing of better inspection for workshops, factories, mines, etc.; refusal to employ children under eighteen; a plan for giving convicts and their families the benefit of convict labor; the forbidding of interstate transportation of the products of convict labor, child labor, and that of uninspected factories and mines; the abolishing of the profit system in government work and substituting either the direct hire of labor or the awarding of contracts to coöperative groups of workers; the establishing of a minimum wage scale; the abolishing of public charity and substituting a system of old age pensions and social insurance which shall protect every worker against unemployment, sickness and accident. Mothers' pensions are also demanded.

*The Political Demands* are absolute freedom of press, speech and assemblage; increase in the rates of the income tax law; increase of rates of corporation tax; the extension of inheritance taxes, graduated according to the value of the estate and the nearness of the kin, and the use of the proceeds from all such taxation to be for the socialization of industry; the abolition of personal or corporate ownership of patents, and the substitution of collective ownership, with a system of direct payment of the inventors by the government, by means of premiums or royalties; unrestricted and equal

suffrage for men and women; universal adoption of initiative, referendum, recall, and proportional representation; the abolition of the veto power of the President; the abolition of the Senate; election of President and Vice-President by direct vote; abolition of the power of the Supreme Court of the United States to pass upon the constitutionality of the laws enacted by Congress; repealing of national laws by referendum vote of the people; abolition of restrictions upon amendments of the Constitution, so that it may be amended by a majority vote of the people; granting the right of suffrage in the District of Columbia, with representation in Congress, and a democratic form of government for local affairs; a democratic form of government for all United States territory; the Bureau of Education to be raised to the rank of a department of the government; extended measures for general education with a plan for vocational training in the useful pursuits; a Bureau of Health and further measures for the conservation of health, with full liberty to all schools of practice; the abolition of Federal District Courts and of United States Circuit Courts of Appeal; a law by which state courts shall have jurisdiction in cases between citizens of the various states and foreign corporations; the election of all judges for a short term; curtailing the power of courts to issue injunctions; the free administration of the law; the calling of a convention for the revision of the Constitution of the United States.

**As a World Movement.** The International Socialist party is represented in every country that has reached an industrial stage. In 1901 the Canadian Socialist League was organized, and while the Socialist vote in Canada has not been large, there has been a steady growth noticeable at all elections. In Australia and New Zealand the Socialist party as such has been kept in the background by the powerful labor parties which have led the industrial reforms, but the Socialists claim that the labor parties, too, are working toward social democracy. The South American republics know socialism, and there is a Socialist party in Japan. The movement is strongest in Germany, France, Russia and England. The great industrial revolution in England during the last quarter of the eighteenth century and the French Revolution during a part of the same period were factors in the movement in Europe.

German Socialists have a great deal of power in the government, as they form the largest political party in the Empire. In France socialism has a strong influence in national affairs, with considerable representation in the Chamber of Deputies, and the party has achieved a number of victories in municipal affairs. Several Socialist organizations in England have worked together under the name of the Labor Party and have achieved considerable success, with a representation in Parliament of over forty members. E.D.F.

Consult Spargo's *Socialism;* Hunter's *Socialists at Work;* Hardie's *From Serfdom to Social Reformer;* Hillquit's *Socialism in Theory and Practice.*

**Related Subjects.** The following articles in these volumes will make clear many of the references in the above discussion of socialism and will give added information:

| | |
|---|---|
| Anarchism | Minimum Wage |
| Child Labor | Mothers' Pensions |
| Communism | Old Age Pensions |
| Convict Labor | Recall |
| Income Tax | Sabotage |
| Inheritance Tax | Social Democrats |
| Initiative and Referendum | Suffrage |
| Labor, Department of | Syndicalism |
| | Vocational Training |

EMINENT SOCIALISTS

| | |
|---|---|
| Bebel, Ferdinand A. | Proudhon, Pierre Joseph |
| Lassalle, Ferdinand | Saint-Simon, Count de |
| Marx, Karl | |

**SOCIAL SETTLEMENT,** an institution that represents one phase of the great modern movement for the uplift of humanity. Social settlements are neighborhood centers of helpfulness, located in sections of great cities where there is a never-ending struggle with poverty, vice and ignorance. In these centers men and women of education and culture live and work, coming in personal contact with the sordid and disheartening conditions that surround their less fortunate brothers and sisters. As they strive to bring into the lives of these people something that will lift them above the old level, they themselves are working out the solution of many social and industrial problems.

Social settlements carry on many activities, as kindergartens, schools in citizenship, clubs, classes, libraries, baths, savings banks, etc., and they usually keep open halls where community groups may hold social, political or religious gatherings. They are headquarters for all kinds of welfare movements, and often institute reforms that are afterward taken up by the city or state. Their influence reaches far beyond the communities in which they are located, and their residents pass on to the whole educational world the information that they have gained first hand.

The first social settlement was founded by men of Oxford University, in London, in 1884. It was the outgrowth of the work begun in Whitechapel, a crowded district in East London, by Arnold Toynbee, and is known as Toynbee Hall. In 1887 Dr. Stanton Coit established the neighborhood Guild in New York, which grew later into the University Settlement. In 1889 Jane Addams and Ellen Gates Starr of Chicago opened Hull House, now one of the best-known social centers in the United States. Since that time settlements and settlement methods have become common in cities, especially in the United States. M.A.H.

Consult Addams' *Twenty Years at Hull House;* Coit's *Neighborhood Guilds.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Addams, Jane | Hull House |
| Community Interests | Tenement |

**SOCIETY FOR THE PREVENTION OF CRUELTY TO ANIMALS.** See CRUELTY TO ANIMALS, SOCIETY FOR THE PREVENTION OF.

**SOCI'ETY ISLANDS,** or **TAHITI ARCHIPELAGO,** *tah'he te ark i pel'a go,* a group of islands in the South Pacific, forming a colony of the French Republic. The islands were officially annexed in 1880. They lie directly east of Australia, about midway between that continent and South America, and about 1,000 miles south of the equator (see colored map, with the article OCEANIA). There are two well-defined divisions of the archipelago—the Leeward and Windward groups. As the largest of the islands, Tahiti (in the Windward group), is 600 square miles in area, and the total area of the archipelago is about 650 square miles, it will be seen that the rest of the islands are of very limited extent. The total population is estimated to be 15,000; nearly 12,000 of the inhabitants live in Tahiti. The natives are a fine type of Polynesians.

The group's highest peak (7,000 feet) is on Tahiti, but all of the islands are volcanic and mountainous, with coral reefs along their shores. At the extreme north in Tahiti is Point Venus, from which astronomers view the transit of Venus. Bananas, cocoanuts, sugar, the vanilla plant and fruits grow in abundance in the fertile soil, but only a small proportion of the tillable land is cultivated. Copra, mother-of-pearl, vanilla, cocoanuts and oranges are exported. Papeete, the chief town and the capital of the French establishments in Oceania, is situated on Tahiti and has a population of about 3,600. This town has a cathedral, a higher primary school and a normal school, and there are several mission schools in various parts of the archipelago. There is regular steamboat service between Papeete and San Francisco, New Zealand and Australia.

**SOCIETY OF JESUS.** See JESUITS.

**SOCIOLOGY,** *sō shi ol' o ji,* the study of the human race, including its history, evolution and future, the laws which govern its development and the place of the individual in relation to society. The scope of sociology is boundless. History, ethnology, civics, economics, anthropology, ethics, psychology, philosophy, and, above all, biology—all the sciences which treat of human beings and the conditions under which they live—are related to and contribute to sociology. This science rests on the assumption that all human experience depends on three things: the physical conditions under which life is maintained, the relation of the individual to other individuals and to society, and the types of association in which individuals influence each other. Before it can begin its research, sociology must have data on all these subjects, and so it goes for its statistics to the other social sciences. With the data which he gathers from every source, the sociologist endeavors to fix the laws of the reactions between nature and human beings, both as individuals and in the group; he is studying the evolution of human personality, the processes which result in types of individuals and of associates, types which act on each other in an endless cycle of cause and effect.

Other sciences—physics, chemistry, mathematics—rest on unchanging, invariable laws. They are exact; they never change from age to age: given certain conditions, certain results are inevitable. Auguste Comte, when he first formulated sociology and gave it its name, held that it, too, might be an exact and invariable science; but not to-day, and probably not for thousands of years to come, can the laws which govern human experience be standardized. Biology, the study of all life, is the great foundation for the study of human life, and biology is even now in an unfinished state. Fundamental truths of biology still remain mysteries. The laws which govern the vital germ in every form of life, which determine color, form and sex, and, in higher planes of life, disposition and character, still evade the most ardent seeker. Theories and hypotheses abound. We seem, little by little, to be coming nearer the truth. Perhaps, philosophers

say, after a long time—hundreds of years or hundreds of centuries—these laws will all be manifest: the biologist will be able to formulate rules as fixed and as changeless as the ratio of one number to another, and in that day biology will become an exact science; and when biology is exact, sociology, too, may be exact.

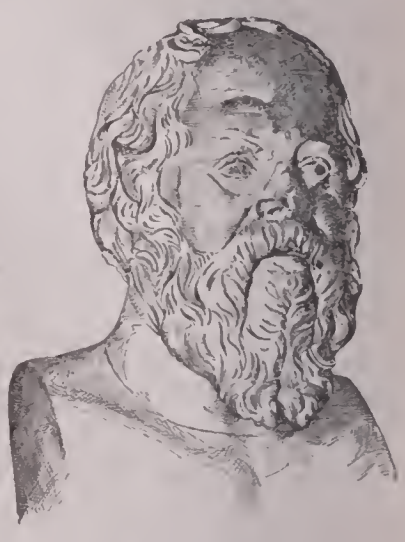
The four classes in the formal study of sociology—each class, in turn, is divided and subdivided—are (1) *descriptive sociology,* which includes all the preliminary work of stating observed phenomena; (2) *social psychology,* which covers the study of the mind of primitive man, the mental workings of the masses, from the mob to the nation; (3) *social ethics,* the formation of theories, hypotheses and judgments on human conduct and the definition of social aims; and (4) *social technology,* the application of known social facts to the bettering of social conditions. The true sociologist, loving his science, might well take his motto from Terence: *Humani nil a me alienum puto*—"I consider nothing human to be unimportant to me."

Consult Strong's *New World-Religion;* Hayes' *Introduction to the Study of Sociology;* Blackmar and Gillins' *Outlines of Sociology.*

**Related Subjects.** In connection with this discussion of sociology, the reader will find much that is of interest in the articles on the contributing sciences named above. He may also consult the following:

| | |
|---|---|
| Alcoholic Drinks | Illiteracy |
| Census | Juvenile Court |
| Charity | Marriage |
| Child Labor | Mothers' Pensions |
| Children, Societies for | Old Age Pensions |
| Communism | Oneida Community |
| Community Interests | Pauperism |
| Crime | Polygamy |
| Debt | Population |
| Divorce | Prohibition |
| Emigration and Immigration | Registration of Births, Deaths and Marriages |
| Environment | Socialism |
| Eugenics | Social Settlements |
| George Junior Republic | Suicide |
| Heredity | Temperance |
| Hull House | Tenement |

**SOCRATES,** *sok'ra teez* (469-399 B. C.), one of the greatest of the Greek philosophers, was born in Athens. He received only a meager education in his youth, but later became familiar with the best philosophy and thought that the highly-cultured Athenian society could offer. For a time his career was that of sculptor, but soon he began to walk the streets and market places, talking to anyone he might meet regarding his soul and the moral life of man in general. From 432 to 429 B. C. he served in the campaign of Potidaea, fought at Delium in 424 and at Amphipolis in 422. He refused to take further part in public affairs after the naval battle of Arginusae, when the mob unjustly demanded the death of ten generals who had been unable to bury the dead; likewise, he opposed tyranny when the thirty tyrants commanded him to help bring about the arrest of the innocent Leon of Salamis.



Socrates * * *
Whom, well inspired, the oracle pronounced
Wisest of men.
—MILTON: *Paradise Regained.*

As a teacher, Socrates was not popular among the citizens of Athens. His personal appearance was against him, for he was bald, had thick lips, a flat nose, ungainly figure and beggarly costume. He tried to reduce his wants to a minimum in order thus more closely to resemble the gods in their perfection. His wife Xanthippe has passed into tradition, possibly without proper basis of truth, as a scolding, arrant shrew whom he endured as a form of self-discipline.

He had many illustrious friends, among them Plato, Crito, Alcibiades, Xenophon, Phaedon, Euclid of Megara and Aristippus. However, his chief work was among the Athenian youths, whom he felt called upon to conduct through love to a nobler moral life. Self-knowledge was his ideal; "Know thyself," his maxim. To him wickedness was the result of ignorance. The good, the useful and the beautiful were declared by him to be identical. No man is willingly bad, he argued, and virtue in itself can be taught. The best rulers are those who are wisest, not the best educated, necessarily, for they will most readily know how to make the people happy.

His method, known as the Socratic, became famous throughout the Mediterranean countries. It was an art of cross-examination which lured even the wisest into contradictions. He veiled his own knowledge behind a professed ignorance and by a series of carefully directed questions brought out from his hearers the truth he sought.

In 399 B.C. he was condemned to death because he had introduced new gods and failed to worship the city divinities, and because of corrupting the youth. During his trial he gave the famous defense known as the "Apology of Socrates," but the jury, consisting of over 500 members, condemned him by a small majority. On the morning of the day of his death his scolding and quarrelsome wife Xanthippe was banished by him from his cell because of the violence of her grief. He is said to have spent the last hour in tranquillity, discoursing with friends on the immortality of the soul. When twilight appeared he drank the poison hemlock, the cup reserved to those condemned, walked up and down, then lay down on his couch and died in quiet.

The Socrates who frequently exclaimed, "How many things there are that I do not need,"

PRISON OF SOCRATES, AT ATHENS
In one of these dungeons, hewn in the rock, the philosopher spent his last hours.

Plato eulogized as follows after his death: "Thus died the man who of all with whom we are acquainted was in death the noblest, in life the wisest and most just." E.D.F.

Consult Wright's *Short History of Greek Literature;* Gomperz's *Greek Thinkers;* Forbes' *Socrates.*

**SO'DA,** the general name of several sodium compounds occurring in nature in natural alkaline waters. The term *soda* is employed more commonly, however, to designate certain commercial compounds used in the household and in the industries. The sodas of commerce are manufactured by various processes from common salt. One kind, known in chemistry as sodium carbonate, is employed in the manufacture of glass and soap, as a disinfectant and as a cleansing agent. Common names of sodium carbonate are *sal soda* and *washing soda.* Sodium bicarbonate is the common *baking soda* or *saleratus* used with sour milk or cream of tartar to raise bread, biscuits or pastry. It is also an ingredient of baking powder (which see). When heated or when mixed with an acid, sodium bicarbonate gives up carbon dioxide, and the escaping gas puffs up the dough. Sodium bicarbonate is used in medicinal preparations for the relief of acidity of the stomach, and is one of the two compounds that make up Seidlitz powders (which see). *Caustic soda,* known in chemistry as sodium hydroxide, is used in making hard soap, paper and dyestuffs, and in bleaching and kerosene oil refining. See SODIUM.

**SODA WATER,** a pleasant, effervescing drink made of water charged with carbon dioxide and flavored with syrups. The carbon dioxide is stored in steel cylinders under great pressure, and the water is in a strong steel or copper tank. When the liquid carbon dioxide is allowed to escape into the water it instantly changes to gas, which is dissolved in the water until the required pressure is reached, when the process is stopped. The pressure in the tank forces the water into the pipes in the fountain, and when it is drawn the rapid escape of the gas causes the water to effervesce. Pop, ginger ale and numerous other soft drinks consist of water flavored with a syrup and charged with carbon dioxide. The chief difference between them and soda water is that they are bottled when charged with the gas, while soda water is prepared by mixing the flavoring syrup and the water in the glass. There is no soda in soda water. It was so named because formerly bicarbonate of soda was used in preparing the carbon dioxide for charging the water.

Soda water was an unknown beverage in England until about 1908, when an American, Harry J. Selfridge, established a great department store in London and invested a large sum in a modern "soda fountain." The new drink became very popular.

**SO'DIUM,** a soft, silvery-white metal that is never found free in nature. Sodium is as soft as wax and lighter than water. It has great affinity for oxygen, and has to be kept in kerosene or naphtha, liquids that contain no oxygen. When thrown upon cold water it decomposes so rapidly that the heat generated melts it; when thrown upon hot water the decomposition sets the hydrogen on fire, and it burns with a bright yellow flame because of the presence of sodium vapor.

Sodium exists in large quantities in its chloride (common salt) and its nitrate (soda saltpeter). It is manufactured for commercial purposes by electrolysis (which see) of sodium

hydroxide or caustic soda. Sodium is used in the laboratory for extracting water from alcohol and ether, and in the manufacture of some compounds. The uses of salt and soda saltpeter are described under the headings SALT and SALTPETER. Sodium arsenate is used in place of arsenic (which see), and the bromide and iodide are employed as remedies in nervous disease.

**SOD'OM,** one of the ancient cities of the plain north of the Dead Sea. It lay in a region described in *Genesis* XIII, 10, as having been "like the garden of the Lord," till Sodom and Gomorrah, a neighboring city, were overthrown by God because of the extreme wickedness of their inhabitants. It was at the time of the destruction of Sodom that Lot escaped in safety, while his wife, lingering on the way, is said to have been turned into a pillar of salt. The fate of Sodom and Gomorrah is repeatedly mentioned in the Bible. Jesus himself, when exhorting His disciples to steadfastness (*Luke* XVII, 32), used the admonition, "Remember Lot's wife."

**SODOM,** APPLE OF, a fruit said to be beautiful to the sight, but to fill the mouth with bitter ashes when tasted. In early literature it is recorded as growing near the shores of the Dead Sea. By many it is considered to have been merely legendary, while others attempt to identify it with one or another of the plants now growing in that region. Some believe it to be a species of gall found on dwarf oaks (see GALLS). The only Bible passage that can be said to refer to this fruit is that found in *Deuteronomy* XXXII, 32:

> For their vine is the vine of Sodom,
> And of the fields of Gomorrah:
> Their grapes are grapes of gall,
> Their clusters are bitter.

**SOFIA,** *saw'je ya,* known as SREDEC (*sreh' dets*) by the Bulgarians, the capital and largest city of Bulgaria, is situated in the western part of the country on an elevated plain 1,800 feet above the sea. It is on a line of railway that after the entrance of Bulgaria into the War of the Nations (which see) was opened from Berlin to Constantinople. The latter city is 300 miles southeast of Sofia (see map of Europe, following page 2092). Most of the modern part of the city has been rebuilt since 1878, and enjoys such innovations as street railways and electric lights.

Among the notable buildings are the palace of the king, a cathedral, the buildings of the university (founded in 1888 and having an enrolment of about 2,200 before the war), a large theater and the government buildings. Sofia is the foremost railroad and industrial center of Bulgaria; it has thriving manufacturing establishments and carries on a prosperous export trade in foodstuffs, attar of roses and hides. The present city is on the site of a Roman town called Sardica. In the older portion are some famous mineral springs. Sofia was bombarded by allied airships during the War of the Nations. Population in 1910, 102,812. See BULGARIA.

**SOIL.** The greater part of the earth's surface is covered with a layer of loose particles, varying in depth from a few inches to several feet. This layer is called *soil.* To the geologist the entire layer is soil, but the agriculturist includes in his idea of soil only those portions that are suitable for the production of plants.

**Formation of Soil.** The processes that form soil have been in operation from the remotest geological ages, and they are still active. The chief agencies in its formation are the atmosphere, water, plants and animals.

*Work of the Atmosphere.* Air is composed chiefly of nitrogen and oxygen, and oxygen is the most active chemical agent known. Under the influence of moisture it attacks the rocks and causes them to decay and crumble; the fine particles formed in this way are added to the soil. Again, in dry regions high winds wear away the rock by driving against it particles of sand which they carry, and the particles thus worn away are carried in the air until they fall to the earth and are added to the soil. The peculiar forms of rocks in the Bad Lands of South Dakota and other localities are fashioned by wind. In sandy regions sand dunes or drifts are formed by the wind, and in other localities fertile soil is often carried greater or less distances and added to the soil of the region where it falls.

*Work of Water.* Water is by far the most important agent in the formation of soil. Running water will wear the hardest rock, and since nearly all running water carries sand and gravel, these assist in wearing the rocks over which the stream flows. The particles worn off are carried downstream until deposited on its bed or banks, forming the great alluvial deposits which characterize the lower portions of the valleys of great rivers; these formations contain some of the most fertile soil in the world.

Rain and snow assist the atmosphere in breaking rocks into small fragments. When

water freezes the ice occupies more space than the water; we have seen pitchers broken by the freezing of the water in them. When water freezes in the crevice of a rock it works in the same way and makes the crevice larger, so that in the course of a number of years the piece of rock is broken off. If we examine the base of any rocky cliff we shall find an accumulation of pieces of various sizes, ranging from those weighing hundreds of pounds to tiny particles of soil. This mass of loose rock at the foot of a cliff is called *talus*. In addition to this, repeated freezing and thawing of water on the surface of rocks constantly wears them away, forming soil. This process is known as *weathering*. Water also acts chemically, since the oxygen in it attacks substances that have been dissolved from the rock.

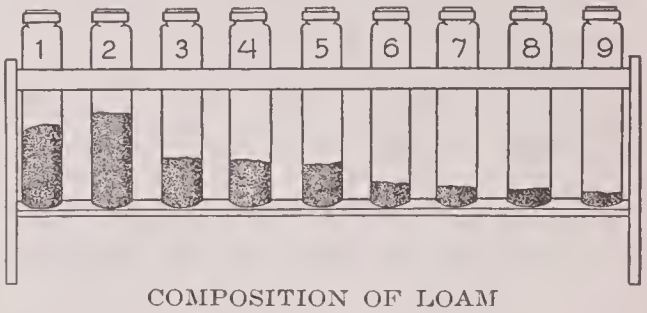
In past geological ages great glaciers covered most of the northern part of North America, and by their movement crushed and ground the rocks into soil, which they deposited where they melted. Much of the soil in Canada and in the United States north of the Ohio River and east of the Mississippi was formed by glaciers (see GLACIER).

*Work of Plants.* The roots of plants, the leaves of trees and the stems of all plants that are allowed to stand and die down in the fall, decay and become a part of the soil. Moreover, the roots, by extracting certain plant food from rocks, help to break them up. Sometimes large rocks are split apart by the roots of trees. Certain minute plants, such as molds, grow on decaying plants and hasten the process of changing these plants to soil.

*Work of Animals.* Animal waste is constantly added to the soil, and sooner or later the animal dies and its body decays and becomes a part of the earth. Animals not only add to the soil, but they are important agents in mixing the soil. Gophers burrow in the alfalfa field and damage the crop. Woodchucks burrow in the clover field and make mounds that are a hindrance to the farmer, and he attempts to destroy these and all other burrowing animals; yet in all ages these animals have performed an important part in making soil. But the small members of the animal kingdom, such animals as the earthworm and the ant, perform a work of far greater value. An authority on agriculture says, "Each ant hill is a real soil-mixing mill."

Earthworms burrow in damp, rich soil and derive their nourishment from the animal and vegetable matter it may contain. In order to obtain their food these worms eat the earth but reject the portion containing no nourishment. In passing the soil through their digestive system the worms pulverize it and cast it forth in a highly fertile state. Darwin estimated that in England these worms brought to the surface more than ten tons of dry mold to the acre. Air enters the soil through the holes made by the worms and aids in the decomposition of substances beneath the surface.

**Transportation of Soil.** We often find the soil on one side of a hill or valley to be very different from that on the other. This is because the soil in one place has been brought there from some other locality, probably by water or ice, and that in the other place is still lying where it was formed. We have already seen that rivers carry soil to the lower part of their course. Rain washes the soil down the slopes of a hill and deposits it on the lowlands. Here the soil is deeper on these lands than on the hillsides. As water carries the soil it also sifts it. In the upper course of the stream, where the current is usually swift, all grades of soil, including coarse gravel, are swept along, but as we go downstream the soil becomes finer and finer, until in the lower course only the finest silt is carried.




COMPOSITION OF LOAM

In twenty grams (about seven ounces) of loam the constituent parts are as follows:

1. Organic matter—humus
2. Very fine sand
3. Clay
4. Silt
5. Fine sand
6. Coarse sand
7. Medium sand
8. Gravel
9. Fine silt

**Kinds of Soil.** Soil is classified according to its composition and according to its structure. Soil contains mineral (inorganic) and animal and vegetable (organic) matter. The minerals in soil are chiefly clay, sand and lime, the last of which is in the form of pulverized limestone. The organic matter, consisting of decaying animal and vegetable substances, such as leaves, twigs and the dead bodies of animals, is called *humus*. A clay soil is more than one-half clay; a sandy soil is at least one-half sand. A loam is a soil in which clay, sand and humus are mixed in about equal proportions. Since humus is necessary to fertility, loams are the most

desirable soils for agricultural purposes. Loams are classified as clayey, sandy, heavy or light, according to their composition. Each is specially fitted to certain crops.

Soils are coarse or fine according to their texture. Fine soils are the more desirable for agriculture, because they contain a larger proportion of humus and also hold water better. Each particle of soil is surrounded by a thin film of water like that on a marble that has been wet. This is the water used by growing plants. Free water drowns the roots and prevents them from absorbing nourishment, so that plants die where there is too much water. Since clay holds water, a certain proportion of clay is necessary to fertility. Sandy soils are infertile, because they do not hold water and because they usually lack the necessary proportion of humus. This may be supplied in a measure by fertilizers. W.F.R.

Consult Brooks's *Soils and How to Treat Them;* King's *The Soil;* Hopkins' *Soil Fertility and Permanent Agriculture;* Snyder's *Soils and Fertilizers;* Hall's *Soils.*

**Related Subjects.** The reader who is interested in a study of soils will find much that is of interest in the following articles in these volumes:

| | |
|---|---|
| Agriculture | Loam |
| Clay | Loess |
| Drainage | Manures |
| Dry Farming | Marl |
| Erosion | Phosphates |
| Fertilizer | Rotation of Crops |
| Irrigation | Sand |

**SOKOTO,** *so'ko toh,* an important state forming part of the British protectorate of Nigeria, in the west-central Sudan country, North Africa. It borders on the Sahara Desert, and in the northern part consists of arid lands, becoming more fertile, however, in the southern portion. It covers an area of over 100,000 square miles and has a population estimated at 10,000,000. The chief town is Sokoto, with a population of 10,000, but the most important commercial center is Kano.

The chief industries are agriculture and cattle raising, the cattle being exceptionally fine, though subject to great loss through plague. The production of coffee is increasing, but the principal products are hides, barley, millet and wheat. British courts of justice have been established, and the country is being opened to large foreign commerce. Ostrich farming has been introduced, and gives promise of being eventually successful. Occasional rebellions against British influence occur, but are usually put down without serious trouble.

**SOLANUM,** *so la'num,* the typical and most important genus of the nightshade family of plants. It includes herbs and shrubs of more than 500 species, especially abundant in tropical America. The most common and important species is the common potato, and another is the tomato. Other well-known species of temperate regions are the bittersweet and the common nightshade, which are widely distributed throughout America and Europe, and the horse nettle and other spiny, troublesome weeds native to the United States. Several species, long ago used as medicine, are still employed by the Chinese as medical remedies. The fruits of many East Indian varieties are eaten, and a species known as the kangaroo apple is a common food in Australia and New Zealand.

**Related Subjects.** The following members of the genus are treated in these volumes:

| | |
|---|---|
| Bittersweet | Potato |
| Eggplant | Tomato |

**SO'LAR ENGINE,** or **SUN MOTOR,** a mechanical device for collecting heat from the sun and utilizing it as motive power. The name is derived from the Latin *solaris,* meaning *sun.* The most successful solar motor yet invented was erected at Pasadena, California, in 1901. It consisted of a huge mirror in the shape of an umbrella, thirty-six feet six inches in diameter at the widest end, tapering off fifteen feet at the bottom. The disk contained 1,788 small mirrors, so arranged that the sun's rays might be concentrated upon a boiler containing 100 gallons of water and space for eight cubic feet of steam. The boiler was connected with machinery that pumped water at the rate of 1,400 gallons per minute. By an automatic arrangement, as soon as steam was developed in the boiler, the mirror was connected with clockwork which caused it to turn with the sun in its course.

It was thought that the solar motor would lead to great development of arid lands by providing cheap means of running irrigation pumps, but little has been accomplished in that direction. The heat developed by solar motors is intense. A solar motor, or burning mirror, as called in England, developed heat which melted a piece of iron in sixteen seconds.

**SO'LAR MICROSCOPE,** *mi'kro skohp,* an instrument for casting a magnified image of a small object upon a screen by means of sunlight or artificial illumination. It consists of a brass tube and a reflecting mirror, so adjusted that the rays of light are reflected into the

tube. The object to be magnified is placed on a stage at the opposite end of the tube. The tube is attached to the inside of a closed window shutter, being placed over a hole. A double-convex lens collects and brings to a focus on the object the light rays, and by means of a second lens a magnified image of the object is projected on a white screen. Modern instruments usually make use of the electric arc or oxyhydrogen limelight instead of the sun's rays. The solar microscope is similar to a stereopticon (which see).

**SO'LAR SYS'TEM.** When you hear someone speak of the sun as "Old Sol" you gain the impression of a friendly relationship, as though the huge ball of fire in the skies were a man to whose faithful care we owe our light, our heat, and an even more valuable possession, the genial sunniness of heart which we feel on pleasant days. There are a great many members of "Old Sol's" family—the solar system, as it is scientifically called—for our own earth is but one of countless bodies that travel round and round him, receiving and reflecting his light and heat in greater or less quantities according to their nearness to or distance from him. First of all, there are the eight large *planets,* of which our earth is fifth in size; next there are the smaller *planetoids,* or *asteroids,* which are counted in hundreds; lastly there are the myriads of *meteors,* which travel in swarms and are so small that they are not visible unless they come in contact with our atmosphere, whereupon they burst into flames and are seen as shooting stars. Besides all these there are the *comets*—"visitors from space," one astronomer calls them—some of which are "transients."

None of the members of the solar system moves about the sun in an exact circle, though all have regular orbits. When the distance of any one from the sun is stated, its mean distance is meant. A peculiar thing about the distance of the larger bodies, first shown to the astronomical world in 1722 by a German named Bode, may be seen in the following table:

| | Tens of millions of miles from sun | Bode's numbers |
|---|---|---|
| Mercury | 3.57 | 4 |
| Venus | 6.72 | 7 |
| Earth | 9.29 | 10 |
| *Planetoid Eros* | *13.55* | |
| Mars | 14.15 | 16 |
| *Planetoid Ceres* | *27.66* | 28 |
| Jupiter | 48.33 | 52 |
| Saturn | 88.60 | 100 |
| *Uranus* | *178.19* | 196 |
| *Neptune* | 279.16 | 388 |

Bode formed his series of numbers by adding 4 to each number in the series, 3, 6, 12, 24, 48, 96. In his day the planets and planetoids italicized in the above table were unknown, but it was seen that the distances of six known planets corresponded very closely to his numbers. In 1781 Uranus was discovered, and was found to correspond fairly well with another number in the table. Astronomers began to take more interest in Bode's Law, and their search for a planet to correspond to the missing number 28 resulted in the discovery of Ceres and other asteroids. Whether or not the law is a mere coincidence or represents a true law of the universe scientists do not yet know.

**Related Subjects.** More about the solar system will be found under ASTRONOMY, and certain theories as to its origin in the article NEBULAR HYPOTHESIS. The reader may also consult the following articles:

| | |
|---|---|
| Asteroids | Planet (with list) |
| Comet | Planetoid |
| Copernicus | Satellite |
| Gravitation | Sun |
| Meteors | |

**SOLDERS,** *sod'erz,* alloys used to join surfaces or edges of certain metals, by fusion at the point of contact. To be effective, a solder must melt more easily than the metal to which it is applied. Solders are of two classes—hard and soft. Hard solders are usually prepared by combining in each case the metal to be soldered with some others. Solder for gold, for example, is prepared from gold and silver, or from gold and copper, or from a mixture of the three metals. Silver solder consists of equal parts of silver and brass, with the addition of a little zinc. Soft solders are prepared from varying proportions of tin and lead, bismuth being sometimes added. Hard solders can be drawn out into threads and hammered into sheets. That is, they are both ductile and malleable. Soft solders melt the more easily but are too brittle to bear hammering. Before surfaces are soldered they must be bright and clean and free from oxide.

**SOLDIERS' HOMES,** homes for disabled or aged soldiers of the armies of the United States. These homes afford provision for the comfort and well-being of soldiers who have lost their health in the country's service. Candidates for entrance into homes must be provided with an honorable discharge from service and a medical certificate, which must show a state of health which unfits him for ordinary labor. Inmates are subject to the Articles of War as if still serving in the army, and they

receive free medical attendance, clothing, food and shelter. A pensioner on entering a home may assign his pension to parent, wife or child, or part of the pension may be drawn, the remainder being kept in trust by the treasurer of the home.

The first soldiers' home was founded in the District of Columbia, by act of Congress, in 1851. This Home is for soldiers of the regular army only. National homes for volunteer soldiers, supported by the Federal government, are situated in the following cities:

| | |
|---|---|
| Dayton, O. | Leavenworth, Kan. |
| Milwaukee, Wis. | Santa Monica, Cal. |
| Togus, Me. | Marion, Ind. |
| Danville, Ill. | Jackson City, Tenn. |
| Hampton, Va. | Hot Springs, S. D. |

State homes for soldiers of the volunteer armies are in the cities named below:

| | |
|---|---|
| Yountville, Cal. | Tilton, N. H. |
| Monte Vista, Colo. | Kearney and Vineland, N. J. |
| Norton Heights, Conn. | Bath and Oxford, N. Y. |
| Boise, Ida. | Lisbon, N. D. |
| Quincy, Ill. | Sandusky, Ohio. |
| Lafayette, Ind. | Rosebury, Ore. |
| Marshalltown, Iowa. | Erie, Pa. |
| Fort Dodge, Kan. | Bristol, R. I. |
| Chelsea, Mass. | Hot Springs, S. D. |
| Grand Rapids, Mich. | Bennington, Vt. |
| Minnehaha, Minn. | Orting and Port Orchard, Wash. |
| Saint James, Mo. | Waupaca, Wis. |
| Columbus Falls, Mont. | Cheyenne, Wyo. |
| Grand Island and Milford, Neb. | |

**SOLE,** a family of flatfish having the characteristic twisted cranium and both eyes on the right side of the body. (See article FLATFISH.) The eyes are small and set close together, the mouth is crooked, and the body a flattened oval, something like the sole of the human foot in shape. These fish are found in warm seas near shore. The common American sole, known locally as the *hogchoker,* inhabits the eastern coast of North America. It has a brownish body marked with black bands. This sole is valueless as a food fish, but the European species is much prized because its flesh is firm and white and of good flavor. The European sole grows from ten to twenty inches in length and averages about a pound in weight. A species of flounder that inhabits the Pacific coast waters is known in California as a sole. This species is an excellent food fish.

**SOL'ID,** a term used in mathematics to define a magnitude with the three dimensions of length, breadth and thickness. Any particular solid takes its name from the shape of its bounding surfaces, as cube, sphere, etc.

In physics, a body is said to be *solid, liquid* or *gaseous* according to the power of its molecules to resist forces tending to change its shape.

**Related Subjects.** The following articles in these volumes discuss various mathematical solids or present important phases of this subject:

| | |
|---|---|
| Cone | Mensuration |
| Cube | Prism |
| Cubic Measure | Pyramid |
| Cylinder | Sphere |
| Geometry | |

**SOLITAIRE,** *sol i tair',* the collective name of many games of cards to be played by one person. The object of the games in all variations is to arrange the cards in suits, and build up or down in regular sequence, while following certain rules. The player's interest lies in the extent of his success in working out the various combinations. Under the name of *Patience* these games have been known and played for centuries, though few ancient writers give details of the various plays. In some variations of solitaire the exercise of skill and judgment is necessary, but in most they depend entirely on the element of luck. A great number of solitaire games are described in manuals of card games.

Consult Hoyle's *Games.*

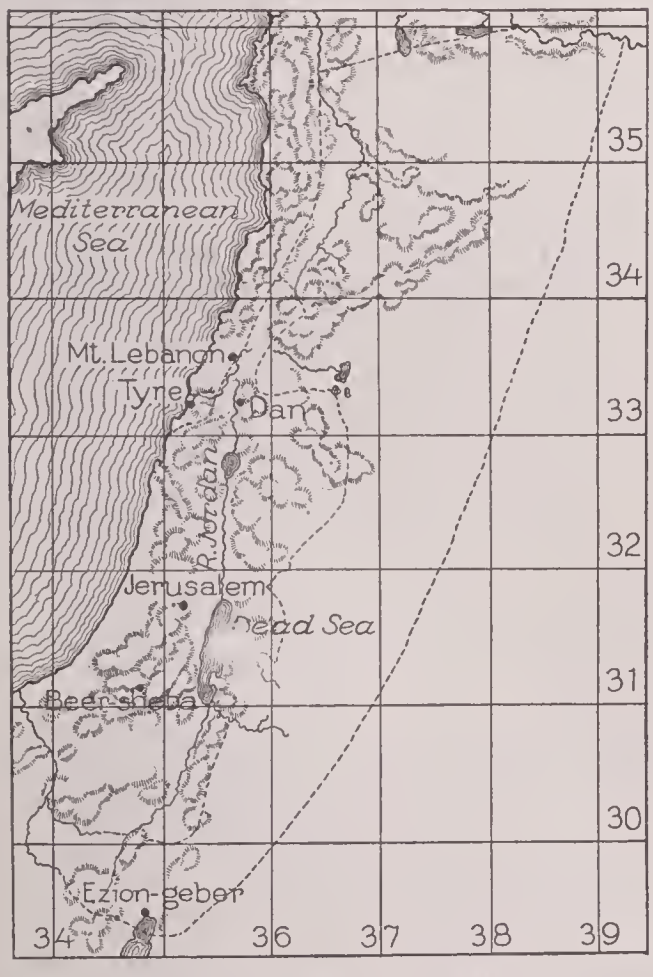
**SOL'OMON,** the third king of Israel and the wisest man of his age, was the second son of David and Bathsheba. His name means *peaceful* and it was given him because of a prophecy which foretold his birth: "His name shall be Solomon, and I will give peace and quietness unto Israel in his day" (*I Chronicles* XXII, 9). Solomon's reign extended from about 990 to 931 B. C. He was born in Jerusalem, but nothing is known about his boyhood. Many suppose that the prophet Nathan was his teacher. However this may be, the knowledge and ability which he showed when he became king would lead to the belief that he had received the best training possible for the high office he was to fill.

When King David was about to die Solomon's brother Adonijah attempted to make himself king; but David had promised Bathsheba that Solomon should succeed him as king, so Bathsheba and Nathan told David of Adonijah's attempt. David then told Nathan to have Solomon ride to Gibeon and there be anointed king by Zadok, the priest. When this was done, Adonijah and his followers feared for their lives, and "each man went his own way," leaving Solomon in peaceful pos-

session of the kingdom; but, according to the custom of his time, Solomon caused the leading men who opposed him to be slain, one by one.

**Solomon's Dream.** Solomon is supposed to have been about twenty years of age when he became king. He was a zealous worshiper of Jehovah, and began his duties by offering sacrifices and giving God thanks for the great favors conferred upon him. In the night God appeared to Solomon in a dream and said, "Ask what I shall give thee;" and Solomon said:

"O, Lord, my God, thou hast made thy servant King instead of David, my father: and I am but a little child; I know not how to go out or come in. And thy servant is in the midst of thy people which thou hast chosen, a great people, that cannot be numbered nor counted for multitude. Give thy servant therefore an understanding heart to judge thy people, that I may discern between good and evil, for who is able to judge this, thy great people?"




THE KINGDOM OF SOLOMON

The dotted line farthest east represents the eastern boundary of the territory directly influenced by his reign.

The record states that "the speech pleased the Lord," and Solomon was promised not only wisdom, but also wealth and honor. The promise was literally fulfilled, for Solomon was recognized as the wisest and wealthiest king of his age.

**Building the Temple and Palace.** According to the account in *I Chronicles,* David, before his death, gave Solomon the plans and full directions for building the Temple, for which he had gathered together most of the material. Solomon formed an alliance with Hiram, king of Tyre, by whom he was furnished with skilled workmen and cedar. The structure was begun in the fourth year of his reign, and seven years were required for its completion. Though small and plain compared with many of the cathedrals of modern times, the Temple was considered to be one of the most wonderful buildings of its time. Its completion established Jerusalem as the center of worship for the nation, as well as the center of government.

Solomon also built for himself a palace upon grounds adjoining those of the Temple. This required thirteen years for its completion, and it was not finished until the twentieth year of his reign.

**Extending Commerce.** Solomon placed fleets of ships on the Red Sea and on the Mediterranean. These vessels were manned by Phoenician sailors, because the Israelites were not acquainted with the art of navigation. The fleets of Solomon are supposed to have sailed southward as far as the southern part of Africa and westward as far as Spain. Some authorities believe that they sailed eastward as far as India, but there is no positive information concerning the extent of any of these voyages. We do know, however, that Solomon extended the commerce of his kingdom to all surrounding nations, and that his ships, for that age, made long voyages. As a result of his trade with so many peoples he gained great wealth, which he expended in maintaining his army and court.

**The Splendor of the King.** Soon after he became king, Solomon made an alliance with Pharaoh, king of Egypt, and married his daughter, bringing her to Jerusalem. His palace was one of the most magnificent structures of the time. His throne was of ivory covered with gold. All the kingdoms over which he ruled "brought presents and served Solomon all the days of his life." "And the king made silver to be in Jerusalem as stones, and cedars made he to be as sycamore trees that are in the lowland, for abundance." We read also that he had 40,000 stalls of horses for his chariots and 12,000 horsemen. In addition to these were several hundred officials of state and attendants who were maintained in and about his palace.

**Solomon's Wisdom.** Solomon was more than a judge and lawgiver to his people. He studied into the secrets of nature and learned many facts that previous to his time had not been observed. From the proverbs which he spoke we know that he had a good knowledge of plants and animals, also that he was a student of human nature. His proverbs are guides to life, and for three thousand years they have influenced men. The Bible tells us that "he

THE DIVISION OF HIS KINGDOM

spoke three thousand proverbs, and his songs were a thousand and five." Only one song, *The Song of Solomon,* and the proverbs found in the book of *Proverbs* are all that remain of his sayings and writings, but these are enough to place him among the wisest of men. After communing with him, the Queen of Sheba, who visited him with all the pomp and splendor of an Eastern monarch, exclaimed, "The half was not told me; thy wisdom and prosperity exceedeth the fame which I heard. Happy are thy men, happy are these thy servants, which stand continually before thee, and that hear thy wisdom."

**His Decline.** Contrary to the Hebrew ideals, Solomon established a harem, and made alliances with women of the surrounding heathen nations. In time, to appease these women, he erected altars to their gods in and about Jerusalem. This weakened his influence over the Israelites and caused dissension in his court. Moreover, the extravagance of the court caused a heavy burden of taxation, under which the people had become restive, so during the last years of his reign the seeds of dissension, which bore fruit in the division of the kingdom soon after his death, were gradually sown. He reigned forty years and was succeeded by his son, Rehoboam.

**Estimate of His Character.** In his temperament and tastes Solomon was the opposite of his father David. He preferred the pursuits of peace to those of war, and under him the Hebrew nation enjoyed a longer period of universal peace and prosperity than at any other time in its history. An eminent authority, Richard G. Moulton, has aptly characterized these two great kings:

> What David achieves, Solomon carries further. If David founded a kingdom, Solomon extended this to an empire. If David had the honor of ordering the service of Jehovah, it was reserved for his son to lay the art and riches of Tyre under contribution to crown the Divine service with the Temple. David is the center of Hebrew poetry; Solomon is the founder of its wisdom.

Consult Caldecott's *Solomon's Temple: Its History and Structure;* Harris's *The Odes and Psalms of Solomon.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| David | Solomon's Song |
| Jerusalem | Temple |

**SOLOMON ISLANDS,** an archipelago in the Western Pacific Ocean about 120 miles west of the Bismarck Archipelago, with an area of 17,000 square miles. The principal islands are Bougainville, Choiseul, New Georgia, Ysabel, Malaita, Guadalcanar and San Christobal. The larger islands are of volcanic origin, the smaller of coral formation. There are several active volcanoes, and earthquakes are frequent. The climate is hot and unhealthful. Great Britain controls the greater part of the archipelago. Many of the islands are covered with dense forests containing ebony and sandalwood; vegetable ivory, copra and pearl shell are exported in large quantities. The population is estimated at 176,000, of whom only 500 are

Europeans, who are there for commercial reasons. The Solomon Islands were discovered by Alvaro Mendaña, the Spanish navigator, in 1567. See map, with article OCEANIA.

**SOLOMON'S SONG, SONG OF SONGS,** or CANTICLES, one of the books of the Old Testament, a dramatic poem written in celebration of wedded love. In its present form the original assignment of parts to characters is difficult to restore. There are two current interpretations, in the first of which King Solomon, disguised as a shepherd, woos a country maiden and takes her finally to his court, where they are married in great splendor, returning afterward to her rural home for a honeymoon. In the second, the maiden, though surrounded by all the allurements of king and court, remains true to an actual shepherd lover, to whom she at last returns. The culmination of either plot is found in the lines (VIII, 6-7):

> For love is strong as death;
> Jealousy is cruel as Sheol.
> . . . . . .
> Many waters cannot quench love,
> Neither can the floods drown it.

In Jewish theology, *Solomon's Song* is considered as an allegory, picturing the close relationship between God and Israel. Christian commentators regard it as symbolizing the union of Christ and the Church.

**SO'LON** (about 639-559 B.C.), an Athenian statesman, one of the most famous lawgivers of all time, whose name is yet a synonym for wisdom. He was by class a noble, and was well educated, but was obliged to support himself by commercial ventures. His first public service consisted in an appeal to the Athenians which led to the regaining of the island of Salamis, long in the hands of the Megarians. About 594 B.C. he was elected archon, and promptly instituted legal and governmental measures which have made his name famous.

Political and economic reforms were sadly needed in Athens. Most of the money had accumulated in the hands of a comparative few; living was high, and the small farmers had been compelled in many instances to mortgage their land, while the free laborers had sold themselves into slavery to obtain the means of subsistence. By a sweeping ordinance Solon annulled all these debts and mortgages and provided that in the future no man should pledge his own person as security in borrowing money. He changed the system of coinage in such a way as to give immediate relief to many, and forbade the exportation of most articles.

His constitutional reforms consisted in a redivision of citizens into four classes, according to income, members of all classes to hold membership in the assembly and in the public law courts. In that offices were open only to members of the three higher classes, and the archonship only to the highest class, the reforms of Solon left the constitution of Athens oligarchic, but the granting to every citizen of legal and judicial privileges was a long step toward democracy.

According to tradition, Solon pledged the Athenians to keep his laws for ten years, and left the state for that length of time. Civil strife broke out almost immediately, however, and before the death of Solon Athens had come into the control of the tyrant Pisistratus.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Archon | Pisistratus |
| Oligarchy | Seven Wise Men |

**SOLSTICE,** *sol'stis,* a term used in astronomy to describe the point in the ecliptic at the greatest distance from the equator, either north in summer or south in winter. The word is derived from the Latin *solstitium,* meaning a *standing still of the sun.* In the spring the sun crosses the equator in the ecliptic to the north of the equator on June 21. The sun apparently stands still or holds the same position for several days before starting southward. It reaches the southern winter solstice about December 22, when the northern day is shortest, and the days then begin to lengthen as the sun turns towards the north and continues thus until June 21, when the northern longest day of the year occurs.

**Related Subjects.** The reader is referred for related information to the following articles in these volumes:

| | |
|---|---|
| Ecliptic | Sun |
| Equinox | Tropics |

**SOLUTION,** *so lu'shun.* When the particles of a solid, such as sugar, or of a gas, as carbon dioxide, or of a liquid, as alcohol, mingle with the particles of a fluid so completely that a uniform liquid results, a *solution* is formed. The resulting liquid is not an example of chemical, but physical, change, for a new chemical compound is not formed. In case of a sugar solution, for example, the substance may be reconverted into sugar by evaporating the water. When any solvent has dissolved as much of a given substance as it can, the solution is said to be *saturated.* At the same time it may not be saturated with respect to another substance,

for a saturated salt solution will dissolve sugar crystals. When a solid changes to a liquid form heat is absorbed, and it is on this principle that freezing mixtures are based. When pounded ice and salt are mixed together and packed about an ice cream receptacle, they change to liquid form and in so doing absorb heat from the contents of the can.

At a given temperature the solubility of a particular solid in a given liquid never varies, but its solubility varies with different solvents. At ordinary temperatures table salt dissolves about three times as freely in water as in alcohol; grease cannot be dissolved in water, but it can be in gasoline. Some very hard substances are slightly soluble. Flint glass, for example, used in making cut glass utensils, dissolves somewhat in aqua ammonia. For this reason the housewife should never clean her cut glass in water containing ammonia. When a gas dissolves in a liquid there is a release of heat and a rise of temperature.

**SOL'WAY FIRTH,** an inlet of the Irish Sea, between Scotland and Cumberland County, England. It is about thirty-five miles long, and its width increases irregularly till it reaches twenty miles. Solway Firth is particularly noted for its spring tide, which drives in as a tidal bore six feet high at the rate of ten miles an hour. The waters are shallow and stocked with fish, particularly salmon. There are several fisheries on its banks, and some minor ports, such as Whitehaven, Harrington and Kirkcudbright.

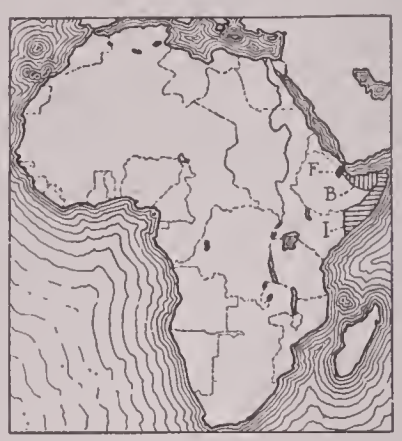
**SOLYMAN II,** *sol'i man* (1494-1566), a sultan of Turkey, known as SOLYMAN THE MAGNIFICENT, under whom the Turkish Empire reached the very height of its power. The name is also given by some authorities as SULEIMAN.

The country at his accession was prosperous, the army and the provinces were in excellent shape, and Solyman showed himself well able to make the best of these advantages. In his own country he is known as the lawgiver, for he did much to improve the administration of laws and incidently to better the condition of his Christian subjects; but it is chiefly for his conquests that he is remembered in European history.

He captured Belgrade and pressed on into Hungary, winning in 1526 a famous victory at Mohacs. Twice he threatened Vienna, and though compelled to retreat, could never be forced to give up his hold on Hungary. He took Rhodes from the Knights of Malta, partially subjugated Persia, and showed his ambition to take part in European political affairs by making a treaty of alliance with Francis I of France. Literature had the benefit of his encouragement, and he proved himself generally an enlightened ruler.

**SOMALILAND,** *so mah'le land,* or **SOMALI,** a region in the eastern part of Africa consisting of English, French, Italian and Abyssinian dependencies. Somaliland forms the peninsula which lies between the Gulf of Aden and the Indian Ocean (see colored map, opposite page 81). The boundaries of the Abyssinian territory, which is in the interior and lies west of the other three dependencies, have not been exactly defined.

**French Somaliland,** known officially as the *Somali Coast,* lies to the north at the head of the Gulf of Aden, between British Somaliland and Eritrea. It has an area of 5,790 square miles. There are several ports, the chief of which is Jibuti, with a population of about 16,500. This town is the seat of government of the colony, and is connected with Abyssinia by a railway. In normal years over 350 steam vessels clear its harbor annually. Somali Coast is not well developed industrially, but there is a considerable export trade in coffee, hides, skins, gold and ivory. Overseas trade is chiefly with France and Great Britain. The country is hilly along the coast, but the interior is an elevated plateau.



SOMALILAND
(F) French; (B) British; (I) Italian.

**British Somaliland** is known officially as *Somaliland Protectorate.* It borders on the Gulf of Aden, and on the land side adjoins Somali Coast and Abyssinian and Italian territory. The protectorate is about 68,000 square miles in area, and has a population estimated to be 360,000. Nearly all of the inhabitants are Mohammedans, and with the exception of those who dwell in the coast towns, they are wandering herdsmen. Berbera, the largest town and the seat of government, has about 30,000 inhabitants during the trading season. Exports include skins, cattle and sheep, ostrich feathers and ivory. The region is for the most part a

sandy plain, with occasional mountains of granite and basalt.

**Italian Somaliland** is a long, narrow strip of country extending along the Indian Ocean from British Somaliland to the Juba River. The dependency is called officially the *Colony and Protectorates of Italian Somaliland*. The area is 139,430 square miles and the population about 400,000. Along the coast the land is flat, but the inland regions are hilly. Hides and skins are exported in large quantities, and live stock, cotton and gums are also shipped. Mogadiscio and Obbia are the chief ports. The region has few forests, and is for the most part arid. See PROTECTORATE. J.S.C.

**SOMERVILLE,** *sum'er vil,* MASS., in Middlesex County, is a residential city two miles northwest of Boston, adjoining Medford and Cambridge. It is on the Mystic River and on the Boston & Maine and the Boston & Albany railroads and electric interurban lines. The population of 77,236 in 1910 had increased to 87,039 in 1916 (Federal estimate). The area exceeds four square miles. The city is built upon hills whose strategic position caused them to be identified with important events of the War of Independence. A circular, slate-stone Powder House, built in 1703, stands on Quarry Hill in the western part of the city, in what is now a public park; fortifications were built upon different hills. Paul Revere on his famous ride in 1775 passed through the city over the street now called Broadway. The prominent modern features of the city are the city hall, state armory, Carnegie Library, hospitals and home for the aged. Slaughtering, pork packing and manufacturing are the leading industries. Somerville was settled about 1631 and was a part of Charlestown until it was separately incorporated in 1842. A city charter was granted in 1871. F.O'B.

**SOMME,** *sohm,* a small river in the northern part of France, in the vicinity of which was fought, in 1916, one of the greatest battles of all time. The Somme rises in the department of Aisne and follows a general westerly course of 140 miles to its estuary on the English Channel. Through this estuary ocean steamers ascend the river to Saint Valery. A canal runs parallel with the Somme from Saint Valery past Amiens to Saint Quentin, and from that point there is communication by canal with the Oise and the Scheldt.

**Battle of the Somme.** This engagement represents the great Anglo-French offensive against the Germans during the summer of 1916. It was directed by General Sir Douglas Haig, commander-in-chief of the British, and the French commander, Marshal Joffre. The British forces occupied the front to the north of the river, while the French held a mile of the front on the northern bank, and a ten-mile front south of the river. The first infantry charge was made on the morning of July 1, but this drive had been preceded by an intense artillery bombardment of the enemy's intrenchments and fortifications. After two weeks of furious fighting the British had advanced three miles on a ten-mile front and had captured 10,000 prisoners; the French, in the same period, had advanced their line six miles and had captured 12,235 men. Then followed furious German counter-attacks, but by the first of August twenty-four square miles of territory had been conquered by the British.

Through August there was a lull in the fighting, during which preparations were made for a renewal of the drive. The second offensive began on September 3 and continued without abatement until interrupted by heavy rainstorms. The allies made their last attacks in November. It was during the second phase of the drive that the British first used "tanks," heavy motor trucks encased in steel armor plate and carrying big machine guns.

In summing up the results of the Battle of the Somme, General Haig claimed that it was a success because (1) it had drawn the enemy from Verdun; (2) it had held large forces of Germans on the western front and enabled Russia to win a victory in the east; (3) it had inflicted heavy losses on the German army. In all, 120 square miles of territory were conquered by the allies. Statements of the losses on both sides were conflicting, but a fairly accurate estimate gave the allied loss as 675,000, and the German as high as 700,000 in killed, wounded and prisoners. See article WAR OF THE NATIONS. B.M.W.

**SOMNAMBULISM,** *som nam'bu liz'm,* or **SLEEP'WALKING,** a curious condition in which a sleeper acts his dreams. Everybody dreams occasionally during sleep, and a great many people talk aloud in their dreams, but the person who translates his dreams into motion is comparatively rare. There are, of course, many degrees of such activity, from simply getting out of bed and walking about, to performing complicated and difficult muscular feats. Tests have been made which prove that, as a rule, a somnambulist cannot hear ordinary sounds; that, whether his eyes are

closed, or half closed, or wide open, he does not see; that he can neither taste nor smell. But he is usually endowed with marvelous muscular control. Sleepwalkers have been known to write letters, to paint pictures, or to perform other familiar tasks; they have also been known to climb steep roofs and to walk along the ridges, to follow narrow and dangerous paths, and to accomplish other feats which they could not perform if they were conscious. When a somnambulist awakes, if he remembers anything at all, he remembers it merely as a dream.

Somnambulism occurs most often in highly sensitive or neurotic individuals, and seems to be aggravated by ill health and sometimes by heavy eating. Relief is secured by building up the general health of the patient and by guarding him against nervous strain and shock. A sleepwalker should not be awakened suddenly.

Consult Janet's *The Mental State of Hystericals;* Tuke's *Sleepwalking and Hypnotism.*

**SOM'NUS,** in Greek mythology, the god of sleep, and the son of Erebus and Nox. He dwelt in a great cave in a remote and quiet valley with his brother Mors, the god of death. Shadowy forms kept watch about the mouth of the cave, and shook great bunches of poppies, while they enjoined silence upon all who came near. In one of the darkened inner rooms of the cave drowsy Somnus lay upon his couch, clothed in black garments studded with stars. On his head was a crown of poppies, and in his hand a goblet of poppy juice. Morpheus, his prime minister, supported his head and protected him during his slumbers. Pleasant Dreams hovered about his couch, and hideous Nightmares lurked in the darkened corners. Sometimes the Dreams were sent out of this valley by way of glittering ivory gates to the earth, where they warned mortals of coming misfortunes.

**SONNET,** *sahn'et,* a form of poem, a branch of the lyric (see LYRIC POETRY), which is limited to fourteen lines, rhymed according to a very definite plan. This verse form originated in Italy, and was given its classic form by Petrarch. He arranged the lines of a sonnet in two groups, an eight-line group known as the *octave* and a six-line group known as the *sestet.* There are but two rhymes in the octave, the usual arrangement being *abba, abba,* while the sestet may have either two or three rhymes which may be placed according to various schemes. The sestet may not, however, be broken into couplets.

The sonnet was introduced into England about the middle of the sixteenth century by the Earl of Surrey and was immensely popular with the writers of the Elizabethan age, Spenser and Shakespeare having each produced numerous examples. They varied the rhyme scheme, however, from the Petrarchan original, and Shakespeare's method has been adopted by many of his successors. Instead of two quatrains and a sestet, he made of the sonnet three quatrains and a couplet, rhymed usually *abab, cdcd, efef, gg.*

As it is so brief, the sonnet must be limited to one idea or emotion. Among the romance peoples any type of subject, light or serious, may be treated in a sonnet, but in English sonnets usually none but the graver thoughts and sentiments find place. The very greatest of English poets have particularly delighted in this form of poem, seeming to realize that by its means they could attain a gemlike perfection impossible otherwise; and Shakespeare, Milton, Wordsworth and Keats are the great names in the history of the sonnet in England. Mrs. Browning's *Sonnets from the Portuguese* have a high place among love poems, and many of Rossetti's sonnets are exquisite. Perhaps the best-known sonnet in English is Milton's *On His Own Blindness;* it is given below, both for its own worth and to show the construction of a sonnet:

When I consider how my light is spent
  Ere half my days, in this dark world and wide,
  And that one talent which is death to hide
Lodged with me useless, though my soul more bent
To serve therewith my Maker, and present
  My true account, lest he, returning, chide;
  "Doth God exact day-labor, light denied?"
I fondly ask. But Patience, to prevent
That murmur, soon replies, "God doth not need
  Either man's work, or his own gifts. Who best
  Bear his mild yoke, they serve him best. His state
Is kingly; thousands at his bidding speed,
  And post o'er land and ocean without rest;
  They also serve who only stand and wait."

Consult Quiller-Couch's *English Sonnets, with Introduction and Notes;* Hall Caine's *Sonnets of Three Centuries.*

**SONS OF LIB'ERTY,** the name adopted by an organization among the American colonists which actively opposed the Stamp Act. It was not a single society with a central government, but a group of patriotic associations which sprang up simultaneously in the different colonies, those of New York and Connecticut becoming strongest. Through committees of correspondence the work of the different so-

cieties was coördinated. The chief mission of the Sons of Liberty was accomplished when the Stamp Act was repealed in 1766, but they still opposed the importation of goods from England and later favored independence.

Originally they were of necessity secret societies, but later worked openly and had to do with many of the early movements toward separation, such as the calling of the Continental Congress. During the latter part of the War of Secession the Knights of the Golden Circle were sometimes called Sons of Liberty, the earlier name having been discredited. See STAMP ACT; REVOLUTIONARY WAR IN AMERICA.

**SONS OF VET'ERANS,** an American patriotic society, organized on September 29, 1879, in Philadelphia, Pa., for a purpose similar to that of the Grand Army of the Republic (which see). The society is composed of lineal male descendants, over eighteen years of age, of honorably discharged soldiers, sailors, or marines who served in the War of Secession. There are now about 1,215 camps and 56,000 members, distributed among twenty-seven state divisions, the national body or general society constituting the commandery-in-chief. A bronze bar, inscribed with the words *Filii Veteranorum,* with a pendant of red, white and blue ribbon, attached to a medallion with the letters "S. V.," is the insignia of the society.

The Sons of Veterans auxiliary is an association of women organized to assist needy veterans and to give aid in the proper observance of Memorial Day.

**SOOT,** a fine, black substance deposited by smoke. It results from the imperfect combustion of fuel, such as wood, coal or oil, and contains much carbon and ammonium salts. The large amount of nitrogen in the latter makes soot an excellent fertilizer, especially for cereals, grasses and carrots. The soot nearest the fire is often a shining brown powder containing dried tar; it is used as a pigment under the name of *bistre.* The blacker soot farther up the chimney, especially that from oil or resin, is the pigment *lampblack.* Soot adheres to anything with which it comes in contact; hence smoke blowing through a city deposits its soot upon the buildings in its path and makes them dingy. In London (which see) the damage from soot is estimated at twenty-five million dollars a year. In the worst cases about three per cent of the coal burned is converted into soot. See SMOKE.

**SOPHISTS,** *sof'ists,* meaning *men of wisdom,* was the name given to wandering instructors in Greece in the fifth and fourth centuries B. C., previous to the rise of the schools of philosophy under Plato and Aristotle. They taught culture, disputation, rhetoric and politics, taking fees from their pupils, and for a hundred years were almost the only schoolmasters of the Greeks. They had no uniform philosophy, but were, in general, skeptical and indifferent to truth, emphasizing effect rather than accuracy. Their influence on literature and oratory was beneficial, but their insincere method of reasoning had a mischievous effect on conduct. They were despised by Socrates and his school, who taunted them with "selling wisdom" and with taking pride in "making the worse appear the better."

Consult Adams' *The Religious Teachers of Greece.*

**SOPHOCLES,** *sof'o kleez* (about 496-406 B. C.), a Greek dramatist, born at Colonus, a suburb of Athens. At the age of twenty-eight he submitted his first play, *Triptolemus,* in competition with Aeschylus and won first prize. He served in political offices as a patriot rather than as a politician, in 440 B. C. was chosen one of the board of generals in the war against the aristocratic party of Samos, was later general in the Peloponnesian War, and a member of the committee that reported on the proposed oligarchichal constitution for the state. In his old age he held a minor priesthood, and at his death was given heroic honors.

SOPHOCLES
From a bust in the Capitoline Museum, Rome.

In talents and virtues, he was constantly offered as an ideal to the Athenian youth, and his whole life was an unusual combination of grace, versatility and success. He won prizes in youth, manhood and old age; and for a period of thirty-two years earned the first prize about twenty times and never fell to the third place.

**Changes in the Drama.** His dramas, of which seven out of the total number of 120 are extant (with fragments of others), represent

marked development in dramatic technique. He introduced a third actor, thus enlarging the scope of the action; increased the chorus from twelve to fifteen members and subordinated it to the main plot, thus making it essentially the ideal interpreter of the action, and completed each play in itself, instead of grouping three about a central theme as Aeschylus and other dramatists had done. His style is characterized by elegance and beauty; his characters are Hellenic in their calm reserve and human in the distinctness with which they are presented.

**Dramas That Are Extant.** His *Antigone* is a problem play, revealing the tragedy of a conflict between the law of the individual conscience and the dictates of political authority. In the *Oedipus Tyrannus* he makes use of what has been called Sophoclean, or dramatic, irony, and shows how the hero Oedipus unknowingly but inevitably fulfils the oracle which has decreed that he should live in incestuous marriage with his mother after slaying his father. The other plays that now exist complete are *Ajax, Electra, Trachiniae, Philoctetes* and *Oedipus at Colonus.* In all there is a pervading sublime, religious reverence, and his conception of Fate is no longer the traditional one of making it a blind, external power, but something, instead, that results inevitably from character and circumstance. Sophocles has rank with Aeschylus and Euripides as the foremost dramatist in the golden age of Pericles. M.R.T.

Consult Wright's *Short History of Greek Literature;* Murray's *History of Ancient Greek Literature.*

**SORBONNE,** *sohr bon',* a famous institution of learning in Paris, the outgrowth of a medieval college of theology. It has belonged to the city of Paris since the middle of the nineteenth century. The modern Sorbonne is housed in one of the finest university buildings in the world, dating from 1889 and known as *La Nouvelle Sorbonne* ("the New Sorbonne"). The institution maintains faculties of science and literature and has splendidly equipped laboratories, lecture rooms and libraries. The faculties of science and letters of the University of Paris have their headquarters in the Sorbonne building. At the outbreak of the War of the Nations about 5,000 students were associated with the institution, and it had about one hundred professorships.

The old Sorbonne was founded in the thirteenth century by Robert of Sorbon, and was originally a hall of residence and study for poor theological students. In the course of time the institution became one of the strongest theological schools on the Continent. In the seventeenth century its buildings were reconstructed by Richelieu, who built a magnificent chapel for its students. Among the changes that occurred when the institution was reorganized after the French Revolution was the abolishment of the faculty of theology.

**SOREL,** *so rel',* a city of Quebec, in Richelieu County. It is on the right bank of the Richelieu River at its junction with the Saint Lawrence, forty-two miles northeast of Montreal and forty miles southwest of Three Rivers. It is served by the Quebec, Montreal & Southern Railway, and is a port of call for Saint Lawrence boats. Sorel is above all else a shipbuilding center, and its deep-water harbor makes it an ideal shipyard. Population in 1911, 8,420; in 1916, about 8,800.

Sorel has considerable water commerce in coal, pulp wood, ore and grain. In addition to ships its chief manufactured products are agricultural and other machinery, clothing, native wines and war munitions. The water works were purchased by the city in 1872, and the gas works in 1881. The city was incorporated in 1889. A convent school for girls, Saint Bernard College (a $200,000 building), the Dominion government's building and the Richelieu Market (1882) are worthy of special mention. The convent and a number of adjacent buildings were damaged by fire on November 9, 1915.

**SORGHUM,** *sawr'gum,* a group of plants belonging to the grass family, one class of which contains a sweet sap from which syrup is made. The syrup-yielding plants are known as *saccharine* sorghums, and the others as *nonsaccharine.* Kafir corn and broom corn, both of which are described under their titles in these volumes, are the best-known varieties of the nonsaccharine class. The saccharine varieties are cultivated for their sap, as forage plants and as packing for silos. About 15,000,000 gallons of sorghum syrup are produced each year in the United States, but recent experiments of the Department of Agriculture indicate that the sap does not make good sugar. Sorghums are tall, earless plants, bearing heads of seeds.

**SORORITY,** *so rahr'i ti,* from the Greek word for *sister,* is the name applied to a Greek-letter society for women students in colleges and universities, corresponding to the *fraternity,* for men. In all essential respects the aims and organization are identical with those of the fraternity. See FRATERNITY; COLLEGE.

**Development.** As the idea of the higher education for women became popular, women began entering the universities to share the educational advantages of their brothers. It was only natural that they should come to feel the same need of sympathetic companionship and a definite outlet for their social instincts as the men had felt and met through the organization of their fraternities. The latter furnished a ready-made model after which the women could pattern.

The first secret society for women was the *Adelphian,* which in 1851 was organized at Wesleyan College, Macon, Georgia. Although this did not begin existence under a Greek name, it followed the fraternity idea in its other features, and in 1905 the name itself was changed to Alpha Delta Phi sorority. Kappa Alpha Theta is usually spoken of as the first sorority, since it was the first to use the Greek letters; it was founded at DePauw University in 1870. In the same year Kappa Kappa Gamma was started at Monmouth College, in Illinois.

Several of the honorary fraternities admit women as well as men to membership. Among these are Phi Beta Kappa, the oldest of the fraternities; Sigma Xi, similar to Phi Beta Kappa, but confined to students following scientific lines; Phi Kappa Phi and Alpha Omega Alpha.

Consult Baird's *American College Fraternities;* Stevens' *Cyclopedia of Fraternities.*

**SORREL,** *sahr'el,* the name applied to several plants belonging to the buckwheat family, whose juicy leaves and stems contain oxalic acid and have a sour taste. In Europe, particularly in France, the plant is cultivated extensively and is used in soups, salads and for greens. Several varieties to which the name is applied are *mountain, Indian, switch, water* and *sheep* sorrel, the latter a weed which grows in barren soil and spreads rapidly. Indian sorrel, grown in tropical countries, is used in making jellies and refreshing drinks. The common American species is a low-growing plant with three-parted leaves on long stems, and bears small white, pink or yellow flowers. Almost all of the sorrels are useful for allaying fever and as a remedy for scurvy. The name is derived from an old French word meaning *sour.*

**SORREL TREE,** or **SOUR'WOOD,** a beautiful tree of the heath family, growing plentifully in the woods of the Southern United States and also found as far north as Pennsylvania, Indiana and Ohio. The names refer to the taste of the leaves and twigs, which hunters and woodsmen sometimes chew to quench their thirst, *sorrel* being derived from an Old French word meaning *sour.* The tree often reaches a height of sixty feet, and has reddish-gray bark and smooth, oblong leaves. In summer it bears graceful clusters of small, white, bell-shaped flowers, which are followed by little, downy capsules. In spring the foliage is bronze-green, but in autumn it turns a brilliant scarlet. The wood is used for turning articles such as tool handles and bearings for machinery, while the leaves furnish a black dye.

**SOTHERN,** Edward Hugh (1859- ), an American actor, born at New Orleans, La. His father, who was a player well known both in America and Great Britain, was opposed to his child following the same profession, and therefore took the boy to England at the age of five and began to train him in the fine arts, especially painting. In 1879, however, Edward refused to continue art work, and in September commenced his theatrical career in New York. He then played unimportant characters in Boston, and in 1881 toured America as an actor of comic parts with John McCullough. After a brief tour of England he again joined the McCullough company.

A period of struggle and poverty followed, and Sothern thought at times of abandoning the stage. But in 1884 his future began to look brighter when he became leading man in such popular dramas as Sardou's *Scrap of Paper* and Howard's *One of Our Girls.* Three years later he took the most important rôle in *The Highest Bidder,* an old comedy found among his father's papers. Sothern's work was heartily praised by the critics, and early in 1888 Daniel Frohman, the New York theater manager, engaged him for a long term of years as the leading man in the Frohman Stock Company. In that position he made notable successes of such dramas as Belasco's *Chumley; The Prisoner of Zenda,* adapted from Anthony Hope's novel, and Justin McCarthy's *If I Were King.* In 1900 he began his acting of Shakespearean tragedies, and soon associated Julia Marlowe with him in productions which for years set the American standard for such plays. He married Miss Marlowe in 1911. In 1916 appeared his autobiography, *The Melancholy Tale of "Me;"* it is a complete presentation of the actor's personality and career.

**SOUND.** If you touch a gong while it is sounding you can easily feel that it is vibrating, and if you press against it to stop the vibrations you bring the sound to a sudden end.

The to-and-fro movement of the gong is the cause of what you hear. As the sides move outward they compress the air in all directions, and as they swing back they allow the air to expand; each particle of air presses against the particles beyond it, then draws back, and so the atmosphere about the gong is formed into a series of globular shells alternately of compressing and of expanding air. When these reach the air in your ear the changes of pressure on your eardrum send the sensation of sound to your brain.

**How Sounds Differ.** Since the surges of air against the eardrum are the cause of sound, it is plain that whether a noise is loud or soft, high pitched or low, pleasant or unpleasant, must depend upon the characters of the sound waves and of the individual ear.

*Loudness.* If you put your feet down gently when you walk, you move quietly; if you stamp, a loud noise results. The greater the force you exert, the stronger the compression which the resulting vibrations produce, and the more intense the effect upon your ear. The tramp of soldiers marching is louder than the noise from one person's feet because the simultaneous waves from sources close together combine their force. But sometimes two sounds result in no sound, for if the compression from one meets an equal expansion from another the waves at that point cease. Thus, if you turn a tuning fork slowly around near your ear you will find four positions in which you cannot hear it unless you hold something between one of the prongs and your ear.

If you hear four trumpets blown one hundred yards away, the sound seems to you about as

RIPPLES ON WAVES

As waves enlarge in circles from the point where disturbance occurs, so do sound waves travel from the exciting cause. (See illustration on next page.)

loud as that from one trumpet fifty yards away, for when the one source of waves is twice as far from you as is the other, the spherical surface of a wave from the first is four times as great as the surface of one from the second, and it contains four times as many particles to share the energy of the sound. The scientific statement of this law is that *the intensity of a sound varies inversely as the square of the distance from its source.*

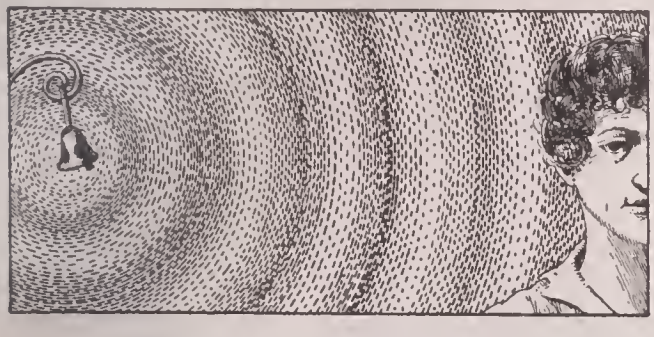
Most of us have tried the experiment of holding a watch between the teeth or pressing it against the forehead. At each vibration caused by the ticking, a wave of compression and expansion travels through the bones of the head just as it would through the air. In fact, the denser the object, the better, as a rule, will it transmit sounds. The reason will be plain to anyone who has played with pool balls; if half a dozen balls are placed in a row, all touching, a slight tap at one end will move the ball at the other end, but if the row is formed with space between the balls the first one must be hit quite hard in order to affect the last. The denser a substance the closer together are its particles of matter, and a sound will therefore travel better through steel or wood or even through water than through air, but will not progress at all in a vacuum.

Why is it, then, that the walls of a house soften the noises of the street? The reason is that when sound waves traveling in one medium meet the surface of another they are partly reflected, just as light is mirrored by a transparent pane of glass. Nature has taken advantage of this law in giving rabbits and other animals ears which they can hold erect to gather in a greater volume of sound; each wave impulse that strikes the wall of the ear at an angle is reflected inward at an equal angle, and so reaches the eardrum. Sound reflection is also responsible for echoes.

*High Tones and Low.* The rapidity with which an object vibrates is what determines the *pitch* of the sound given out. Thus a soprano, to sing high *C,* must send out four waves from her vocal organs in the time that a contralto singing middle *C* gives out one. The actual number of vibrations for middle *C,* whether sounded by human vocal chords, piano strings or wind instruments, is 256 per second. The ear takes note of sounds containing as many as 30,000 or even 40,000 vibrations a second, but is unaffected by fewer than 30.

The conditions which regulate the rate of vibration of any object are nearly all known, and our knowledge of them is utilized in making and in tuning musical instruments. Thus the low strings on a mandolin are thicker than the high strings, for to double the weight of a string halves its number of vibrations. To raise the pitch of a string you tighten it, doubling the number of vibrations if you quad-

ruple the tension, and to play a high note you shorten the string with your finger, doubling the number of vibrations if you halve the length. The same laws govern other stringed instruments and the drum. The pitch of wind instruments depends on their length, and on



HOW SOUND WAVES SPREAD

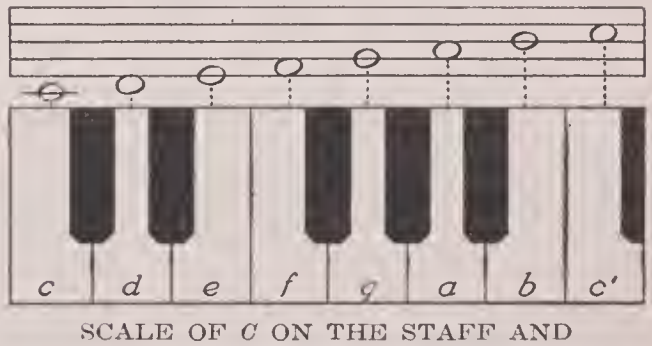
If sound waves could be seen they would appear as an ever-widening circle, moving from the exciting cause. Though unseen, they are as real as a widening circle of ripples on water. If the exciting cause be violent, as when a cannon is fired, the force of the waves of sound may destroy the eardrum.

whether or not they are open or closed at the ends; the reasons for this will be made clear by reference to the diagram in the article ORGAN, after a study of the explanation below of the length of sound waves.

*Noise or Music.* If we leave out of consideration the differences in personal likes and dislikes, the only distinction between musical and unmusical sounds is that the former have regular, the latter irregular, vibrations. A confusion of sounds makes *noise,* for the various sound waves mingle and cause the ear to receive a jumble of sensations. If you stand on a hill above a city, or high up in a skyscraper, you find many of the sounds of the city, which below are so disagreeable, to be distinct musical tones; but, as in music, notes which separately are pleasant may produce discord if sounded together.

Discord in music seems to be due to what are known as *beats.* If you strike any two adjacent piano keys simultaneously, you can distinctly hear throbs in the sound. The waves from the two notes start at the same instant, but because the upper string vibrates faster than the lower its first push against the air is completed sooner and it starts to draw back while the other is still moving outward. It starts its second push still farther ahead and continues to gain until after a time an instant comes when the expansive force of one exactly balances the contractive force of the other and there is silence. The next instant the one wave has gained on the other again, and with the two once more moving in the same direction, the sound surges out with doubled intensity. Since a beat occurs only as often as one wire has made a complete vibration more than the other, there will be as many beats per second as the difference between the number of vibrations each makes. Notes which sound about thirty beats per second make the most disagreeable combination; above and below that number the unpleasantness gradually decreases, and seventy or more beats per second are not noticeable. When notes differing more than seventy vibrations produce discord, as do *C* and the *B* above it, there are beats with or between the *overtones.* Piano tuners always listen for beats.

**Quality of Sound.** *Overtones* are the notes produced when an object vibrates not only as a whole but also in parts. If you rest a small piece of paper on the center of a violin string it will not be thrown off while the string is vibrating, for while the left half moves up the right half moves down and the center is motionless. Thus, while the whole string is producing the *fundamental* note, each half is producing a note an octave higher, called the




SCALE OF *C* ON THE STAFF AND KEYBOARD

first overtone. By vibrating in thirds also, the string sounds another overtone, in fourths another, and so on. Overtones are very important in music, for, as proved by Helmholtz, their number and strength determine quality of tone.

**Sympathetic Vibration.** If you hold down the loud pedal of a piano, so that all of the wires are free to vibrate, and sing a note into the wires, they will send back the same tone with so much realism that they seem to be mocking you. This is because the waves from the fundamental and overtones of your voice set in motion the wires which are of the proper length, tension and thickness to sound them. Sometimes a certain note on a piano will cause window panes to rattle, and sometimes glass is broken by vibrations set up by music. On the other hand it is because of sympathetic vibration that an old house gives to music such a mellow sound.

**Speed of Sound.** Nearly every one has tried the experiment of counting between a stroke of lightning and the peal of thunder which follows, to learn how far away the flash occurred. If you count in seconds and divide the result by five, you will have an approximately correct idea of the number of miles, for sound travels through the air about a fifth of a mile in a second, and light covers 186,000 miles in a second, which for practical purposes is an instantaneous rate. The temperature of the air affects the speed of sound; at the freezing point it is about 1,090 feet per second and increases about two feet for every degree Centigrade, or a little over one foot for every degree Fahrenheit.

**When There's No Ear to Hear.** A man on a hilltop sees a large tree fall half a mile away, but no other evidence of its fall reaches his senses. He sees a rushing cataract still farther away, but except for sight has no evidence of its existence. If he says the falling tree and the waterfall make no sound, is he right? If the sound waves of the air do not reach the ear, is there sound? Imagine a tree falling a hundred miles from a human being, or as far from one of the lower animals or any other form of animal life. Would it make a sound? Does sound issue from a telephone ringing in an empty house far from other buildings?

There are few livelier questions for discussion, but even scientists do not agree upon the answer. C.H.H.

**Related Subjects.** The following topics in these volumes may be consulted in connection with this article on sound:

| | |
|---|---|
| Ear | Light |
| Echo | Music |
| Harmonics | |

**SOUND'ING,** the process by which ocean depths are determined. In very early times attempts were made to find the depth of water for the purpose of aiding navigators, but it was not until the nineteenth century that instruments were invented which could be successfully used for deep-sea sounding. The introduction of submarine cables made necessary a detailed knowledge of the contour of the ocean bed and greatly stimulated efforts to perfect a satisfactory sounding machine. The simplest sounding device is the plummet, a lead shaped like a window weight, to one end of which a stout cord is attached. It is thrown into the water, and as it sinks it draws the cord with it, which, being marked in feet, shows the depth. See PLUMMET.

For deep-sea and scientific purposes the plummet is replaced by a diving rod, which is a hollow cylinder with valves at the top and bottom, opening upward. It is weighted with iron sinkers slightly conical in shape, with a cylindrical hole through which the diving rod easily passes, and these are so attached to the head of the rod that they become loose and slip off when it strikes the bottom. The hempen cord of the common plummet is replaced by a fine piano wire, which passes over a grooved wheel, and the depth is measured on the principle of a cyclometer. As the rod is hollow, it brings up a core of mud from the bottom. The valves which were open in the descent close and preserve the contents, while the sinkers remain behind and are lost.

**SOURIS,** *soo'ris,* a town in the southwestern corner of Manitoba. It is on the Souris River and on several branches of the Canadian Pacific Railway, twenty-four miles southwest of Brandon and 151 miles west of Winnipeg. The word *souris* is French for mouse, and was given to the town and the river because of the many muskrats in the river. Plum Creek, so called for the wild plums which grow on its banks, empties into the Souris River at this point. The town was founded in 1882. Population in 1911, 1,854; in 1916, 1,845.

Souris is a railway division point, and has Canadian Pacific repair shops. Among the largest manufacturing establishments are a flour mill, a furniture factory, and a foundry and machine shop. The shipment of grain raised in the surrounding agricultural district is an important industry, as is shown by the capacity (200,000 bushels) of the local elevators. The town owns and operates its waterworks and electric light and acetylene gas plants. The $50,000 postoffice, erected in 1912, and the $45,000 collegiate institute, are splendid stone structures.

**SOURIS,** a town in Kings County, in the northeast part of Prince Edward Island, on Colville Bay. It is on the Prince Edward Island Railway, sixty miles almost directly east of Charlottetown. Fishing, the leading industry, is mostly for lobsters, but considerable attention is given to cod, hake and haddock. Sawmills and planing mills, cheese box and motor boat factories are the only manufacturing establishments of importance. Population in 1911, 1,089; in 1916, about 1,500.

**SOUSA,** *soo'za,* JOHN PHILIP (1854- ), an American composer and bandmaster, was born at Washington, D. C. He studied music

in that city, making a specialty of the violin, and at the age of seventeen was conductor of an orchestra. In 1880 he became leader of the United States Marine Corps Band and for twelve years maintained it among the greater musical organizations of the world. While in this work he began to compose marches, which were among the first to contain a large amount of syncopation, or "ragtime" rhythm. This form of music rapidly attained national popularity, and the Marine Band was probably in greater demand than any other organization of the kind in America.

JOHN PHILIP SOUSA

In 1892 he founded Sousa's Band, and during the next eight years directed it in practically every state and territory of the American nation, and in Canada. Between 1900 and 1905 he made four tours of Europe, and in 1910 and 1911 a tour of the world. Many honors were bestowed upon him abroad, among them the palms of the French Academy, the rank of Officer of Public Instruction by the French government and the Grand Diploma of Honor by the Academy of Hainaut, Belgium.

Sousa is one of the most prolific composers in musical history, and his marches are better known than the compositions of any other American musician. His band is by far the best in the United States. For these reasons it was especially fitting that he should be selected to organize bands at the Great Lakes Training Station, in Illinois, on Lake Michigan, after the entrance of the United States into the War of the Nations, in 1917. He was also made an officer in the United States navy, with the provisional rank of lieutenant. The Navy Department has officially adopted his collection, entitled *National, Patriotic and Typical Airs of All Countries*. Among his most popular marches are *The Washington Post, Under the Double Eagle, El Capitan, Liberty Bell, King Cotton* and *The Stars and Stripes Forever;* the last-named undoubtedly has been more popular than any other band or orchestra music of the twentieth century. His descriptive composition, or suites, such as *Last Days of Pompeii* and *The Chariot Race*, and his comic operas, such as *El Capitan* and *The Charlatan*, have also won unusual public favor. Sousa has done some interesting work in his novels, *The Fifth String* and *Pipetown Sandy,* and in his descriptive book, *Dwellers in the Western World.* R.D.M.

**SOUTH AF'RICA,** UNION OF. See UNION OF SOUTH AFRICA.

**SOUTH AF'RICAN WAR** (1899-1902), a struggle for supremacy in South Africa between the British government and two Boer republics—the South African (now the Transvaal) and Orange Free State. This war grew out of the jealousy and ill-will existing between the Boers, or Dutch settlers, and the foreigners, or *Uitlanders,* most of whom were British subjects. In 1884 gold was discovered in the Transvaal, and the large influx of Uitlanders to the district served greatly to disturb the placid Boers. The latter, who believed that the Uitlanders hated them and would seek to gain political control of the government, put forth every effort to check such a plan. Under the leadership of their president, Paul Kruger, they so modified the naturalization laws that in 1887 the term of residence necessary for securing citizenship was fixed at fifteen years. The foreigners protested against this and other restrictions as unjust, and in 1896 the opposition took concrete form in an armed uprising known as Jameson's Raid.

Negotiations between the British government and that of the South African Republic failed to secure a peaceful solution of the difficulty, and in October, 1899, war was declared, the Orange Free State joining with its sister republic against the British. At the outbreak of hostilities an army of 12,000 British troops was stationed in Natal and small detachments were posted at Kimberley, on the western frontier of Orange Free State, and on the Bechuanaland and Rhodesian borders. The Boers swarmed into Natal and shut up the British force at Ladysmith. The English troops under generals French and Gatacre checked the Boer advance into Cape Colony and Lord Methuen opened the way to Kimberley. The British then met with a series of discouraging reverses, but in January, 1900, reënforcements arrived under Lord Roberts, Lord Kitchener acting as his chief-of-staff.

A new campaign was immediately begun. On February 27, the Boer general, Cronje, surrendered to Lord Roberts at Paardeberg in Orange Free State, and the following day a

final and successful attempt raised the siege of Ladysmith, where for months the British troops had been suffering from disease and starvation. British advances were made in the northern part of Cape Colony, and on March 13 Lord Roberts entered Bloemfontein, the capital of Orange Free State, and the republic was proclaimed British territory.

After encountering the Boers under General Louis Botha on the Vet River, Lord Roberts crossed the Vaal and entered the city of Johannesburg on May 31. Five days later he took Pretoria, the capital of the South African Republic, and President Kruger fled to the Portuguese territory in the east. The British forces in Natal pushed north, driving the Boers before them, and united with Lord Roberts in a drive against General Botha, who was forced east into the mountains and surrendered on Portuguese territory, in September, 1900. The South African Republic was then declared British territory under the name of the Transvaal.

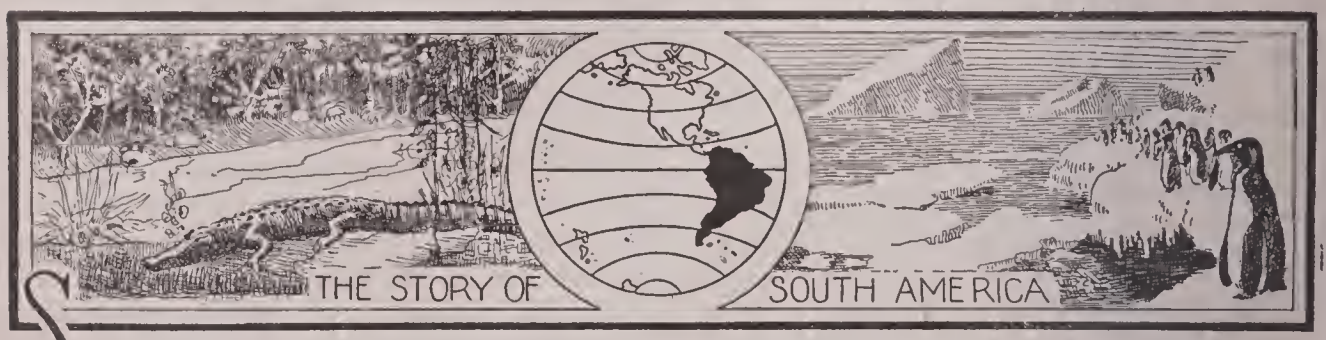
The rest of the struggle was characterized by guerrilla warfare. Lord Kitchener assumed command and began the task of pacifying the country. The daring action of small Boer detachments under generals Botha and De Wet lengthened the struggle, but the Boer leaders, one after another, were weeded out, and the final surrender was made on May 3, 1902. The total Boer enlistment did not exceed 75,000, while the British forces engaged numbered nearly 450,000 men.

The terms of peace provided that the Boers surrender all arms and munitions and swear loyalty to the new sovereign, Edward VII, and in return all prisoners outside of the colony were to be brought back to their homes and no proceedings were to be taken against burghers for action in connection with the war. Civil administration was to succeed the military government as soon as possible, and be followed by representative government; the Dutch language was to be allowed in courts of law and be taught in schools; a sum of $15,000,000 was to be granted to aid in the restoration of property. E.B.P.

Consult Mauriee's *History of the War in South Africa;* De Wet's *Three Years' War.*

**Related Subjects.** Further information on various phases of this subject may be gained from the following articles in these volumes:

| | |
|---|---|
| Boer | Ladysmith |
| Botha, Louis | Orange Free State |
| Jameson, Leander Starr | Rhodes, Cecil John |
| Kimberley | Roberts, Earl |
| Kitchener, Horatio Herbert, Earl | Transvaal |
| Kruger, Stephanus J. P. | Union of South Africa |




**SOUTH AMERICA,** *a mer' i ka,* one of the great continents into which the earth is divided. With North America, with which it is connected by the narrow Isthmus of Panama, it forms what is known as the New World, a name adopted after the discovery of America in the fifteenth century. South America is only slightly smaller than North America, but it contains only about two-fifths as many inhabitants. The southern continent, including Mexico and Central America, is usually called *Latin America,* because its white inhabitants are chiefly of Spanish or Portuguese descent and speak one of these languages. Though North and South America have developed along different lines from an economic standpoint, it is significant that they are the world's greatest centers of democracy. In all their vast territory there is not one country governed as a monarchy.

**Size and Location.** Like North America, the southern continent is irregularly triangular in shape, with its widest extent in the north and the apex in the south. It has an area of 7,700,000 square miles, and occupies nearly one-seventh of the total land area of the globe. Its greatest length, from Punta Gallinas to Cape Horn, is 4,800 miles, and its greatest width, along the fifth degree of south latitude, is 3,300 miles. It extends about 1,000 miles nearer to the South Pole than does Australia, which is considered the southernmost continent.

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GREATER ANTILLES
CARIBBEAN SEA
ATLANTIC OCEAN
PACIFIC OCEAN
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Port au Prince
HAITI
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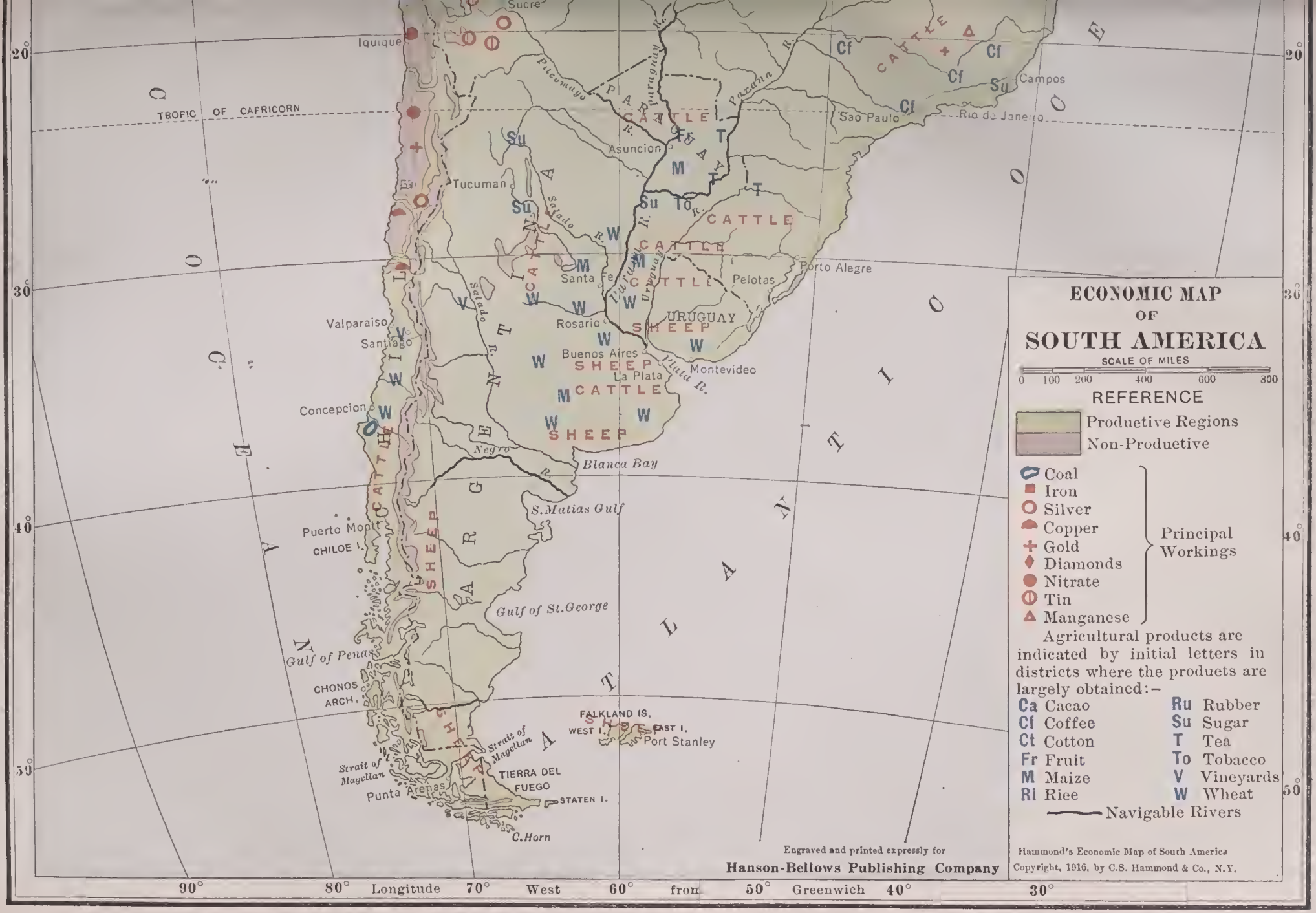
Sto. Domingo
San Juan
PORTO RICO
LEEWARD IS
LESSER ANTILLES
WINDWARD
DOMINICA (Br.)
MARTINIQUE (Fr.)
Port of Spain
TRINIDAD
Barranquilla
Gulf of Venezuela
Maracaibo
La Guaira
Caracas
CATT.
Orinoco Delta
Orinoco R.
Georgetown
Paramaribo
Cayenne
BRITISH
DUTCH
FRENCH
GUIANA
VENEZUELA
Colon
Panama Canal
Gulf of Darien
Gulf of Panama
Panama
Cauca
Magdalena R.
Bogota
COLOMBIA
Meta R.
Guaviare R.
Branco R.
Mouths of the Amazon R.
EQUATOR
Quito
Guayaquil
EQUADOR
Negro R.
Yapura R.
Amazon River
Manaos
Para
Maranhao
Ceara
Maranon R.
Ucayali R.
Juruha R.
Purus R.
Madeira R.
Duvida R.
Tapajos R.
Xingu R.
Tocantins R.
Araguaya R.
Parahiba
Pernambuco
BRAZIL
Acre R.
Guapore R.
Mamore R.
Lima
Callao
PERU
L. Titicaca
La Paz
Cuyaba
San Francisco R.
Bahia


ECONOMIC MAP
OF
SOUTH AMERICA
SCALE OF MILES
0 100 200 400 600 800
REFERENCE
Productive Regions
Non-Productive
Coal
Iron
Silver
Copper
Gold
Diamonds
Nitrate
Tin
Manganese
Principal Workings
Agricultural products are indicated by initial letters in districts where the products are largely obtained:–
Ca Cacao
Cf Coffee
Ct Cotton
Fr Fruit
M Maize
Ri Rice
Ru Rubber
Su Sugar
T Tea
To Tobacco
V Vineyards
W Wheat
Navigable Rivers
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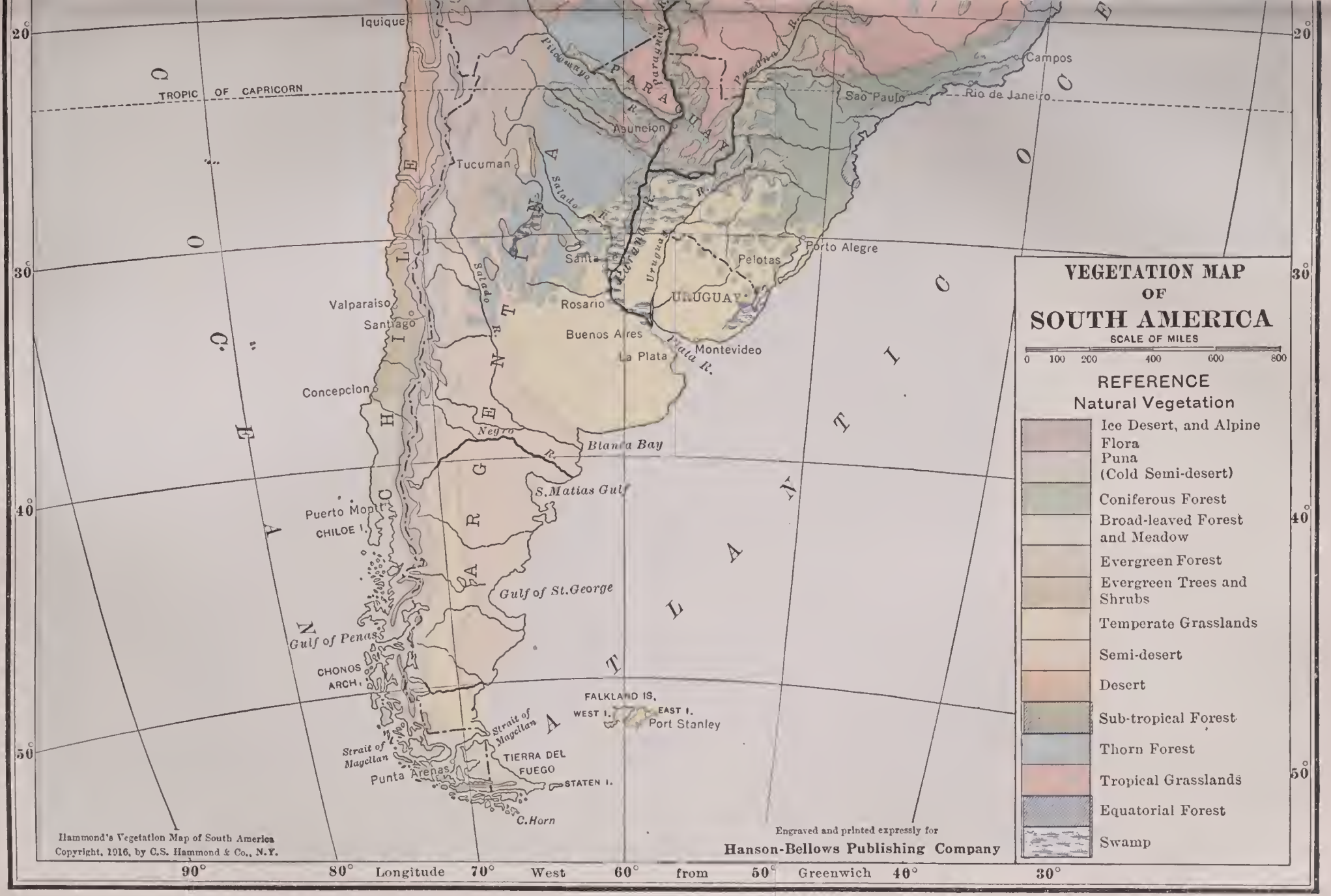
TROFIC OF CAPRICORN
Iquique
Sucre
Tucuman
Asuncion
Campos
Sao Paulo
Rio de Janeiro
Porto Alegre
Pelotas
Santa Fe
Rosario
Buenos Aires
La Plata
Montevideo
Valparaiso
Santiago
Concepcion
Puerto Montt
CHILOE I.
Blanca Bay
S.Matias Gulf
Gulf of St.George
Gulf of Penas
CHONOS ARCH.
Strait of Magellan
Punta Arenas
TIERRA DEL FUEGO
STATEN I.
C.Horn
FALKLAND IS.
WEST I.
EAST I.
Port Stanley
PACIFIC OCEAN
ATLANTIC OCEAN
CHILE
ARGENTINA
PARAGUAY
URUGUAY
CATTLE
SHEEP
20°
30°
40°
50°
90°
80°
70°
60°
50°
40°
30°
Longitude West from Greenwich

80°
70°
60°
50°
40°
30°
20°
10°
0°
EQUATOR
GREATER ANTILLES
JAMAICA
Port au Prince
HAITI
DOMINICAN REPUBLIC
Sto. Domingo
San Juan
PORTO RICO
LEEWARD IS.
GUADELOUPE (Fr.)
DOMINICA (Br.)
MARTINIQUE (Fr.)
ST. LUCIA (Br.)
LESSER ANTILLES
WINDWARD IS.
ATLANTIC OCEAN
CARIBBEAN SEA
NORTH AMERICA
Barranquilla
Gulf of Venezuela
La Guaira
Port of Spain
TRINIDAD
Maracaibo
Panama Canal
Colon
Gulf of Darien
Caracas
Orinoco Delta
Cauca R.
Magdalena R.
Orinoco R.
VENEZUELA
Georgetown
Paramaribo
Cayenne
Gulf of Panama
Panama
Bogota
Meta R.
COLOMBIA
BRITISH GUIANA
DUTCH
FRENCH
Guaviare R.
Mouths of the Amazon R.
Quito
Negro R.
Yapura R.
Branco R.
EQUADOR
Guayaquil
Manaos
River Amazon
Para
Maranhao
Maranon R.
Ucayali R.
Jurua R.
Purus R.
Madeira R.
Tapajos R.
Xingu R.
Tocantins R.
Araguaya R.
Ceara
Parahiba
Pernambuco
BRAZIL
Acre R.
PERU
Lima
Callao
Guapore R.
Tocantins R.
Bahia
Mamore R.
Cuyaba
L. Titicaca
La Paz
San Francisco R.
PACIFIC OCEAN


VEGETATION MAP
OF
SOUTH AMERICA
SCALE OF MILES
0 100 200 400 600 800
REFERENCE
Natural Vegetation
Ice Desert, and Alpine Flora
Puna (Cold Semi-desert)
Coniferous Forest
Broad-leaved Forest and Meadow
Evergreen Forest
Evergreen Trees and Shrubs
Temperate Grasslands
Semi-desert
Desert
Sub-tropical Forest
Thorn Forest
Tropical Grasslands
Equatorial Forest
Swamp
Iquique
TROPIC OF CAPRICORN
Tucuman
Asuncion
Campos
Sao Paulo
Rio de Janeiro
Porto Alegre
Pelotas
Rosario
Buenos Aires
La Plata
Montevideo
URUGUAY
Valparaiso
Santiago
Concepcion
Blanca Bay
S. Matias Gulf
Puerto Montt
CHILOE I.
Gulf of St. George
Gulf of Penas
CHONOS ARCH.
FALKLAND IS.
WEST I.
EAST I.
Port Stanley
Strait of Magellan
TIERRA DEL FUEGO
STATEN I.
Punta Arenas
C. Horn
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20°
30°
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50°
90° 80° Longitude 70° West 60° from 50° Greenwich 40° 30°

80°
70°
60°
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20°
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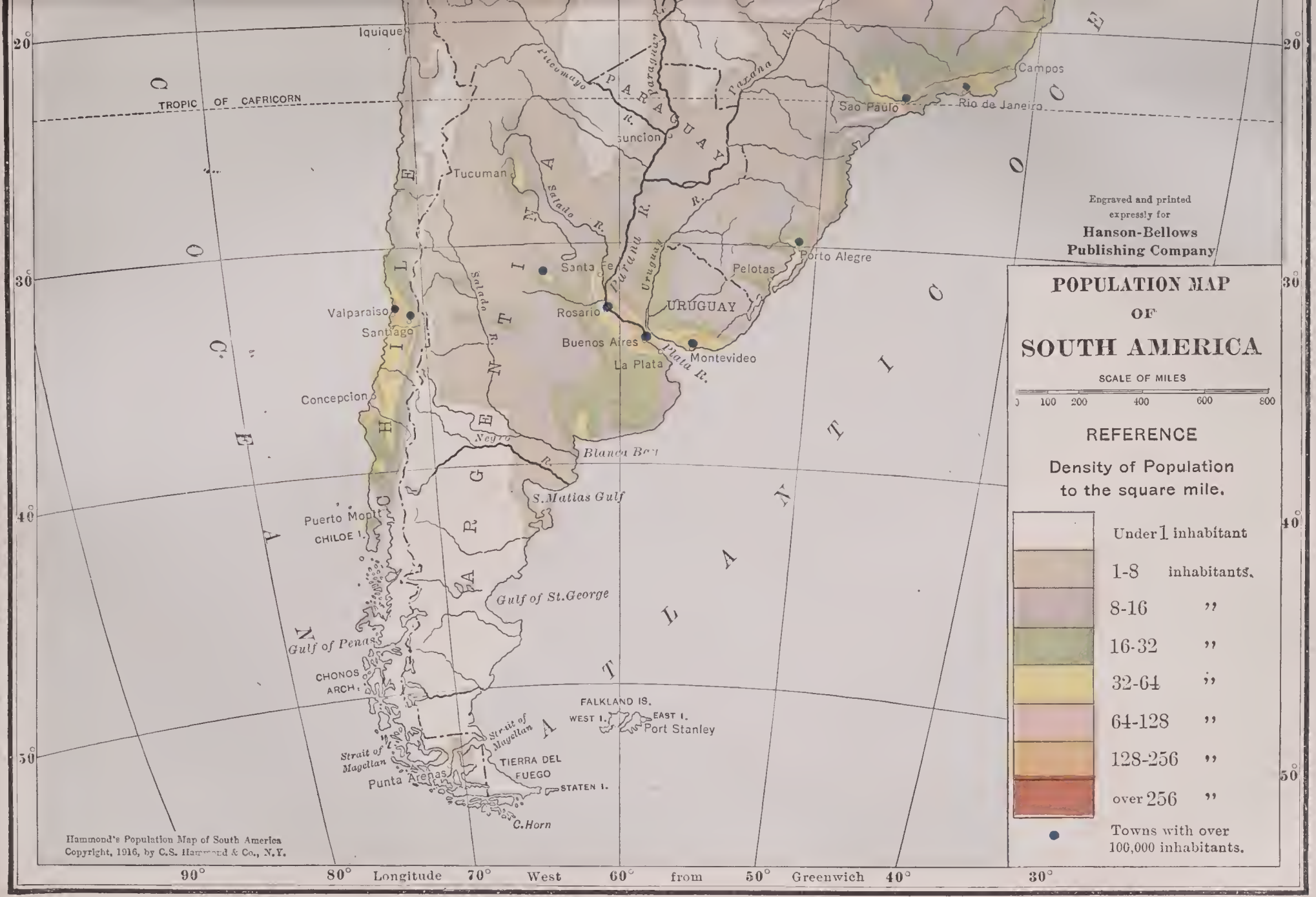
EQUATOR
EQUATÓR
GREATER ANTILLES
CUBA
JAMAICA
DOMINICAN REPUBLIC
Port au Prince
Sto. Domingo
PORTO RICO
San Juan
LEEWARD IS.
LESSER ANTILLES
WINDWARD IS.
GUADELOUPE (Fr.)
DOMINICA (Br.)
MARTINIQUE (Fr.)
ST. LUCIA (Br.)
TRINIDAD
Port of Spain
CARIBBEAN SEA
ATLANTIC OCEAN
NORTH AMERICA
Gulf of Venezuela
Barranquilla
Maracaibo
La Guaira
Caracas
Colon
Panama Canal
Gulf of Darien
Gulf of Panama
PACIFIC OCEAN
VENEZUELA
Orinoco Delta
Orinoco R.
Georgetown
Paramaribo
Cayenne
BRITISH GUIANA
DUTCH GUIANA
FRENCH GUIANA
Mouths of the Amazon R.
Cauca R.
Magdalena R.
Bogota
COLOMBIA
Meta R.
Guaviare R.
Quito
ECUADOR
Guayaquil
Negro R.
Yapura R.
Amazon River
Manaos
Para
Maranhao
Ceara
Parahiba
Pernambuco
Maranon R.
Ucayali R.
Jurua R.
Purus R.
Madeira R.
Tapajos R.
Xingu R.
Tocantine R.
Araguaya R.
BRAZIL
Acre R.
Lima
Callao
PERU
Grapore R.
Mamore R.
L. Titicaca
La Paz
BOLIVIA
Cuyaba
Bahia
Sao Francisco R.


POPULATION MAP
OF
SOUTH AMERICA
SCALE OF MILES
0 100 200 400 600 800
REFERENCE
Density of Population
to the square mile.
Under 1 inhabitant
1-8 inhabitants.
8-16 ,,
16-32 ,,
32-64 ,,
64-128 ,,
128-256 ,,
over 256 ,,
Towns with over
100,000 inhabitants.
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Sao Paulo
Rio de Janeiro
Campos
Valparaiso
Santiago
Concepcion
Puerto Montt
CHILOE I.
Gulf of Penas
CHONOS ARCH.
Strait of Magellan
Punta Arenas
TIERRA DEL FUEGO
STATEN I.
C. Horn
FALKLAND IS.
WEST I.
EAST I.
Port Stanley
Gulf of St. George
S. Matias Gulf
Blanca Bay
Negro R.
Salado R.
Paraná R.
Uruguay R.
Plata R.
Paraguay R.
Pilcomayo R.
Paraná R.
PARAGUAY
URUGUAY
CHILE
ARGENTINA
ATLANTIC OCEAN
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20° 30° 40° 50°

GREATER ANTILLES
DOMINICAN REPUBLIC
JAMAICA
PORTO RICO
LESSER ANTILLES
GUADELOUPE (Fr.)
DOMINICA (Br.)
MARTINIQUE (Fr.)
SANTA LUCIA (Br.)
ST. VINCENT (Br.)
BARBADOS (Br.)
GRENADA (Br.)
TOBAGO (Br.)
TRINIDAD (Br.)
CARIBBEAN SEA
ATLANTIC OCEAN
CEN. AMERICA
Panama Canal
Panama R.R.
Colon
Panama
Gulf of Panama
G. of Venezuela
CURAÇAO
Puerto Cabello
La Guaira
Barranquilla
Cartagena
Maracaibo
Valencia
Caracas
Barcelona
Port of Spain
Orinoco Delta
Merida
Orinoco R.
Ciudad Bolivar
VENEZUELA
Georgetown
Paramaribo
Cayenne
Medellin
Antioquia
Bucaramanga
Honda
Bogota
Meta R.
Atures
BRITISH
DUTCH
FRENCH
C. Orange
Gulf of Buenaventura
C. Corrientes
COLOMBIA
Sierra Pacaraima
GUIANA
Buenaventura
Cali
Popayan
Tumaco
Bolivar
C. San Francisco
Quito
Cotopaxi
Chimborazo
Guayaquil
G. of Guayaquil
ECUADOR
Napo R.
Putumayo R.
Iquitos
Cuenca
Pt. Parina
Paita
Piura
Maranon R.
Ucayali R.
Chiclayo
LOBOS IS.
Trujillo
Huaraz
Pasco
Callao
Lima
Ica
Arequipa
Mollendo
Arica
PERU
Iquique
Tocopilla
Antofagasta
Taltal
Caldera
Serena
Ovalle
Valparaiso
Santiago
Talca
Concepcion
Temuco
Puerto Montt
Ancud
CHILOE
G. of Corcovado
CHONOS ARCH.
Mt. San Valentin
Gulf of Penas
CAMPANA I.
WELLINGTON I.
MADRE DE DIOS I.
Strait of Magellan
SANTA INES I.
Punta Arenas
TIERRA DEL FUEGO
Mt. Darwin
STATEN I.
WOLLASTON G.
C. Horn
Grande Bay
Gulf of St. George
C. Tres Puntas
Puerto Madryn
Rawson
Viedma
S. Matias Gulf
Blanca Bay
C. Corrientes
Bahia Blanca
General Roca
Negro R.
Tandil
General Acha
Azul
Buenos Aires
La Plata
Montevideo
Mercedes
Rosario
Cordoba
Parana
Mendoza
Uruguay R.
Valparaiso
Santiago
Talca
Concepcion
Temuco
Chuy
Rio Grande do Sul
Porto Alegre
Pelotas
Salto
Paysandu
Fray Bentos
Colonia
URUGUAY
Paraguay R.
Asuncion
Villa Rica
Villa Elisa
Corrientes
Tucuman
Catamarca
Rioja
Jujuy
Tarija
Pilcomayo R.
Puerto Pacheco
Concepcion
Trinidad
Matto Grosso
Cuyaba
Santa Cruz
Cochabamba
Oruro
La Paz
Sucre
Potosi
L. Titicaca
Mt. Illampu
BOLIVIA
PARAGUAY
Madeira R.
Purus R.
Juruha R.
Javary R.
Yapura R.
Negro R.
Amazon R.
Manaos
River
Santarem
Obidos
Mouths of the Amazon R.
Bragança
EQUATOR
C. Para
Maranhao
Granja
Parnahiba
Ceara
Aracati
C.S. Roque
Theresina
S. Francisco
Tocantins R.
Xingu R.
Tapajos R.
Araguaya R.
Carolina
Parahiba
Pernambuco
Francisco R.
Joazeiro
Alagoas
Penedo
Aracaju
Santa Maria
Bomjardim
Caravellas
Bahia
Palma
Rio de Contas
Cannavieras
Goyaz
Paracatu
Porto Alegre
Diamantina
Bello Horisonte
Ouro Preto
Victoria
Petropolis
Campos
Campinas
Sao Paulo
Rio de Janeiro
Santos
Curitiba
Paranagua
Desterro
Laguna
Cruz Alta
Rio Pardo
Taquary
Triunfo
BRAZIL
Geral Mts.
Negro R.
Iça R.
Juruha R.
Purus R.
Madeira R.
Tapajos R.
Xingu R.
Araguaya R.
Tocantins R.
Francisco R.
Sun
Parana
Paraguay
Uruguay R.
Plata R.
GALAPAGOS IS.
(To Ecuador)
INCEFATIGABLE I.
ALBERMARLE I.
ST. FELIX I.
(To Chile)
ST. AMBROSE
(To Chile)
MAS A TIERRA I.
(To Chile)
MAS A FUERA I.
(To Chile)
JUAN FERNANDEZ IS.
TROPIC OF CAPRICORN
FALKLAND IS (Br.)
Port Stanley
Railroads
Projected Railroads
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POLITICAL MAP OF SOUTH AMERICA
SCALE OF MILES
0 100 200 400 600 800 1000
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80° 70° 60° 50° 40°
20° 10° 0° 10° 20° 30° 40° 50°

**The People.** South America's 55,000,000 inhabitants represent a number of races. There are, first, the descendants of the native Indians, who inhabited that continent when the white man discovered it. The natives were divided into numerous tribes, speaking different but related languages and having various degrees of civilization. The Spaniards and the Portuguese who came here married Indian women, and this intermarrying produced a race of half-breeds, or *mestizos*. By far the greater proportion of the inhabitants of South America belong to this race of mixed blood. Later on, negroes from Africa were brought as slaves, and these by intermarriage contributed yet another strain of blood to the population. As a result of the intermingling of these various races there is no color prejudice in South America. The race problem, as between white and negro, which is a cause of friction in North America, does not exist in the southern continent. Of late years large numbers of Italians and Spaniards have come to the continent, settling particularly in Argentina. A number of Germans, Englishmen and citizens of the United States are located in the large towns. The Germans are most numerous, at least 500,000 being colonized in Brazil.

**Coast Line and Islands.** With the exception of the southern portion of the western coast, which is indented by numerous fiords and is bordered by islands, the coast line of South America is remarkably regular. In this respect South America resembles Africa, while North America resembles Europe. The large indentations are the Gulf of Darien on the north; the mouth of the Amazon on the northeast; and Bahia, or All Saints, Bay, the Bay of Rio de Janeiro, the mouth of the Rio de la Plata, Blanca Bay, the Gulf of San Matias and the Gulf of Saint George on the southeast. The only important indentation on the Pacific coast is the Gulf of Guayaquil, which indents the coast of Ecuador.

There are few islands belonging to the continent. Those worthy of mention are Trinidad, off the northern coast; Tierra del Fuego, separated from the mainland by the Strait of Magellan; the Falkland Islands, east of the southern extremity of the continent, and the Galapagos Islands, situated at the equator, west of Ecuador.

## *Physical Features of South America*

**Plains and Mountains.** Looking at a physical map of the continent, one finds that there are several points of resemblance between its physical structure and that of North America. The most striking feature, as in North America, is the great mountain system that extends along the western coast, forming, as it were, the backbone of the continent. This mountain system is known as the Andean Cordillera, or Andes. Next to the Himalayas in Asia it is the highest mountain range in the world, and its loftiest peak, Aconcagua, is about 23,080 feet above the sea. Between the Andes and the Pacific Ocean there stretches for a distance of 4,000 miles a narrow plain, which has an average breadth of forty miles and a maximum breadth never exceeding a hundred miles. To the east of the Andes extends the great central plain, as in the northern continent, and, to complete the comparison, it should be noted that this plain is bordered on its eastern side by a series of low mountains known as the Highlands of Brazil, corresponding to the Appalachian Mountains.

The great central plain, which occupies nearly two-thirds of the continent, can be divided into several distinct regions. In the south are the vast level plains known as the *pampas* of Argentina. North of this extends the broad plateau of Brazil, presenting alternate ridges and valleys, thickly covered with forests on the side next the Atlantic, and opening into steppes or pastures in the interior. North of this stretches the basin of the Amazon, a vast plain of more than 2,000,000 square miles, possessing a rich soil and humid climate. This region is covered with dense forests in which there are numerous wild animals, and is thinly inhabited by savages, who live by hunting and fishing. The basin of the Amazon is separated by the plateau of Guiana from the basin of the Orinoco River, which consists of extensive plains called *llanos*.

The Andes Mountains, especially in the region around the equator, contain several active volcanoes which are among the highest in the world. These are Chimborazo, 20,703 feet high; Cotopaxi, 19,613; Antisana, 19,335; Cayambe, 19,186; Maipo, 17,670; and Sangai, 17,464. This region is subject to frequent and violent earthquakes.

**Rivers.** South America contains the largest river system in the world—the Amazon—which drains nearly one-third of the continent. To

the north of the Amazon is the Orinoco River, and to the south is the Plata. These great river systems bear a striking resemblance to those of North America. Thus, the Amazon may be compared to the Saint Lawrence; the Orinoco to the Saskatchewan-Nelson; and the Plata to the Mississippi-Missouri. Among the other important rivers are the Tocantins, the São Francisco, the Rio Negro and the Colorado, all of which flow into the Atlantic. Because of the nearness of the Andes to the coast, the rivers flowing into the Pacific are short.

**Lakes.** In striking contrast with North America, the southern continent contains very few large lakes. The largest is Titicaca, situated in the Andes between Bolivia and Peru. It covers an area of nearly 5,000 square miles, or about two-thirds the area of Lake Ontario,

ONE OF THE LARGEST CATARACTS IN THE WORLD

The Falls of Iguazú, at the junction of three republics, Brazil, Paraguay and Argentina, where the Iguazú River joins the Parana, rank among the most magnificent spectacles of the world. They are forty-six feet higher and some hundreds of feet wider than Niagara. Situated in the midst of virgin, tropical forests, they make a remarkable impression on the tourist who is willing to stand the hardships and difficulty of reaching them from Buenos Aires, partly by rail, partly by steamer and several days' journey on horseback.

and lies at an altitude of 12,545 feet. It is 130 miles long, about thirty miles wide and has a maximum depth of 700 feet.

**Climate.** All of the continent north of Rio de Janeiro lies within the tropics, while the southern portion is in the south temperate zone. In contrast with North America, this continent has a remarkably equable climate, for in the northern portion the intense heat is greatly modified by the altitude, while the southern portion is free from sudden changes because of the nearness of the ocean and the influence of the mountains. The temperature during midwinter averages about 80° Fahrenheit in the north and 35° in the south; during midsummer it averages about 85° in the north and 50° in the south. The lowlands along the Orinoco and the Amazon and the coast of Brazil have a hot climate and a high degree of humidity. The seasons are here just the opposite of those in the northern hemisphere, summer occurring in December, January and February, and winter in June, July and August. The rainfall is heaviest in the Amazon basin, where it averages fifty to seventy-five inches a year, but reaches in some parts 200 inches and more. It diminishes gradually toward the south, until the arid region, constituting a large part of Argentina and most of Patagonia, is reached.

**Vegetation.** The vast tropical region is covered with a luxuriant vegetation represented by a large number of species, some of which are of gigantic proportions. Characteristic of this region are the tropical forests called *selvas*, which extend through the whole valley of the Amazon and constitute the greatest continuous forest area in the world. These forests contain giant trees whose upper parts are covered with lianas, creepers and all sorts of twining and climbing plants, while the ground under them is covered by a thick undergrowth, or jungle, which is impenetrable in many places. This type of vegetation is the result of the great heat and the high degree of humidity produced by the excessive rainfall. In the subtropical regions the chief trees are palms, bamboos, cedars, mahogany and ebony trees, while the mountains are covered with conifers, mostly South American pines. South of the Amazon Valley extends the forested plateau of Matto Grosso, which means *great woods*, and south of this is the region known as the Gran Chaco of Parana, where the wax palm is the typical tree. A native plant of this region is a holly, from the leaves of which a beverage called *maté*, or Paraguay tea, is produced. In Argentina forests of beech prevail.

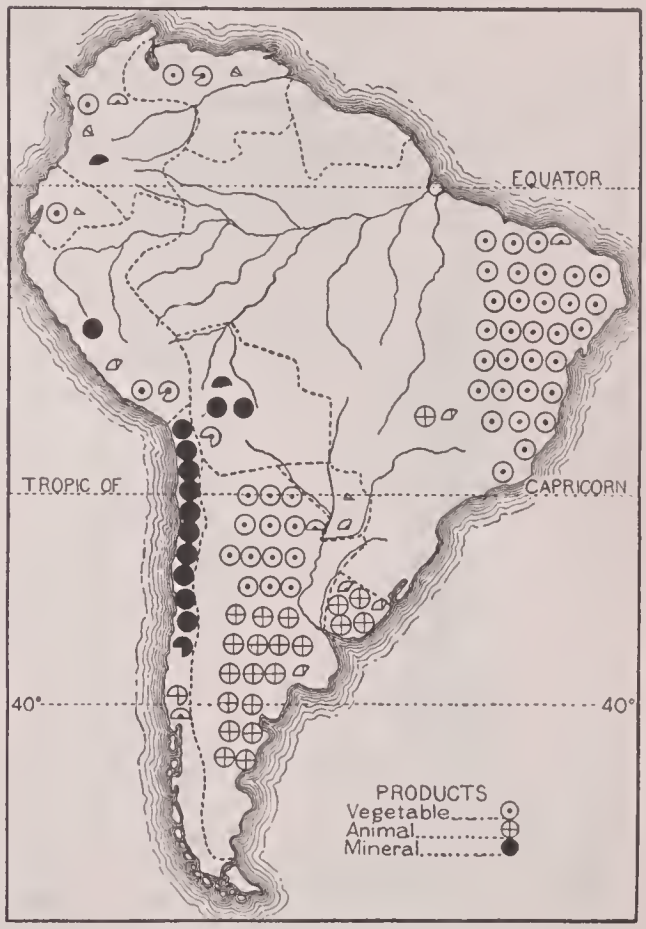
Among the valuable tropical trees of South America is the rubber tree. Several trees which yield important drugs are also found here. Among them are the cinchona (from which quinine is extracted), which grows on the eastern slopes of the Andes in Bolivia, Peru and Ecuador, and the coca tree (the source of cocaine), found in the tropical valleys of the Andes. There are numerous kinds of trees bearing fruits that are usually very large and covered with extremely thick shells. Among these are the cannon-ball tree and the Brazil-nut tree. Many useful tropical and subtropical plants have been introduced here and grow in abundance. Among them are cotton, tobacco, rice, coffee and cane sugar.

**Animal Life.** South America is noted for the richness and variety of its animal life, which is different in many particulars from that of North America. The southern continent not only contains a great number of species, but possesses many species of animals that are not found on any other continent. On the other hand, some of the commonest animals are not found here. About a fourth of all the mammals known occur in South America, but, curiously enough, almost all of the wild animals so abundant in Asia and Africa are missing.

The most powerful of the flesh-eating animals is the jaguar, which is the only formidable beast of prey on the whole continent. There are several families of monkeys, two of which differ from those of the Old World. A group of mammals peculiar to this continent consists of the toothless animals, such as the blood-sucking bats, sloths, anteaters and armadillos. Horses, cattle, sheep and goats were not among the native animals of South America, but there are found here such animals as the llamas and the vicuñas, which are relatives of the camel. The largest of the native mammals is the tapir. Wolves are not found in South America.

The birds of the tropical sections are noted for their brilliant plumage, and include humming birds, flamingoes, toucans, aracaris, chatterers and a great variety of parrots. The largest bird of prey in the world, the condor, is found in the Andes. Chief among the reptiles are alligators, boas, rattlesnakes and turtles. The rivers teem with fishes, and the number and variety of species found here are greater than in any other part of the world. In the tropical regions the insects are very numerous, including many species of butterflies of large size and gorgeous hues. The beetle family is also well represented, some species being much larger than those found in other regions.

**Mineral Resources.** The mineral wealth of South America is great and varied, and consists of gold, silver, copper, mercury, diamonds, coal and other valuable minerals. The celebrated silver mines at Potosi in Bolivia have yielded over $1,500,000,000 since the arrival of the Spaniards in these regions. There are considerable supplies of gold in Venezuela and Guiana. Brazil has extensive deposits of coal and iron, and previous to the discovery of the fields in South Africa it was the principal diamond country of the world. The desert coast of Chile constitutes the world's chief source of supply of nitrate, and is also rich in deposits of guano and borax.




SOUTH AMERICAN EXPORTS

Map showing distribution, by countries, of the three main classes of South American exports. Each circle equals $10,000,000. Amounts of less than $1,000,000 (animal products for Bolivia and for Ecuador; mineral products for Argentina, Uruguay, Paraguay and Ecuador) are not shown.

## *History of the Continent*

During his third voyage of exploration in 1498 Christopher Columbus explored the island of Trinidad and first touched the mainland at the mouth of the Orinoco. During his fourth voyage of exploration, from 1502 to 1504, he coasted along the continent from the peninsula of Yucatan in Mexico to Venezuela. The next navigator to explore South America was Alonzo de Ojeda, a Spaniard, who followed the coast from near the equator to Venezuela. He was accompanied by Americus Vespucius, who published the first account of the New World, and whose name was given to the two continents. After Balboa had crossed the Isthmus of Panama and discovered the Pacific Ocean, Francisco de Pizarro conquered Peru in 1531-1534, and his companion, Diego de Almagro, pushed farther south into Chile. Francisco de

# OUTLINE AND QUESTIONS ON SOUTH AMERICA

## Outline

**I. Position and Size**

(1) Latitude and longitude (see map)
(2) Relation to other continents
(3) Greatest length, 4,800 miles
(4) Greatest breadth, 3,300 miles
(5) Area, 7,700,000 square miles
(6) Comparative area

**II. Shape and Coast Line**

(1) Roughly triangular—like North America
(2) Regular coast line—like Africa
(3) Few islands
(4) Coast waters

**III. Geographic Features**

(1) Resemblance of surface features to those of North America
(2) Andes
  (a) Chief peaks
(3) Central plain
(4) Highlands of Brazil
(5) Rivers
  (a) Amazon greatest in world
(6) Lakes
(7) Climate

**IV. Vegetable and Animal Life**

(1) Characteristic vegetation
  (a) Tropical forests
  (b) Economically valuable forms
(2) Animals
  (a) Absence of powerful wild animals
  (b) Forms peculiar to this continent

**V. Minerals**

(1) Silver and gold
(2) Other metals
(3) Nitrate

**VI. The Inhabitants**

(1) Native races
(2) European immigration
(3) Mestizos

**VII. History**

(1) Discovery and conquest
(2) Independence secured
(3) Revolutions
(4) Recent progress

## Questions

Why is South America one of the first continents which the child in school is asked to draw?

What is the loftiest mountain peak on the continent? How does it compare with the loftiest of North America?

Why has South America a more equable climate than North America?

What white man first touched the mainland of the continent, and where?

How does the largest lake in South America compare in size with the smallest of the Great Lakes?

What mineral substance does one of the western desert regions produce, and for what is it used?

How does it happen that there is little or no color prejudice in South America?

What is the largest river system in the world? How long is the main river? What is the total length of navigable rivers in the system?

Name four common domestic animals of North America which are not native to this continent.

Is South America farther from the South Pole or nearer to it than Australia? How much?

Name two South American trees which yield important drugs. For what are they used?

How many of the continents are larger than South America? How many have a larger population?

Orellana crossed the Andes and, following the course of the Amazon from its headwaters to its mouth, reached the Atlantic Ocean in 1541. While the Spaniards were exploring the continent from west to east, the Portuguese began in 1531 to push into the interior from east to west. They eventually occupied the vast region of Brazil. Spain and Portugal had almost entire control of the continent until the beginning of the nineteenth century. The Spanish colonies declared their independence in 1810 and established several republics after the model of the United States. After a protracted struggle Spain formally recognized their independence in 1826. In 1823 Brazil became independent of Portugal and retained a monarchical form of government which lasted until 1889, when a republican form of government was adopted.

For the greater part of the nineteenth century these countries were disturbed by periodical internal revolutions, and their progress was in consequence slow. Since the beginning of the twentieth century more stable political conditions have prevailed and a great economic development has taken place, as the vast natural resources of the continent are being opened up. South America is playing to-day an important part in the international trade of the world. O.B.

Each country's history is treated in special articles in these volumes. In addition to reference books there referred to, consult Bryce's *South America: Observations and Impressions;* Post's *Across the Andes;* Bingham's *Across South America.*

**Related Subjects.** Much additional information on various phases of South American geography may be gained from the following articles in these volumes. Almost all of the articles on the political divisions also contain lists, so the range of reading indicated is a wide one.

ISLANDS

Falkland
Galapagos
Tierra del Fuego
Trinidad

MOUNTAINS

Aconcagua
Andes
Chimborazo
Cordillera
Cotopaxi

POLITICAL DIVISIONS

Argentina
Bolivia
Brazil
British Guiana
Chile
Colombia
Dutch Guiana
Ecuador
French Guiana
Paraguay
Peru
Uruguay
Venezuela

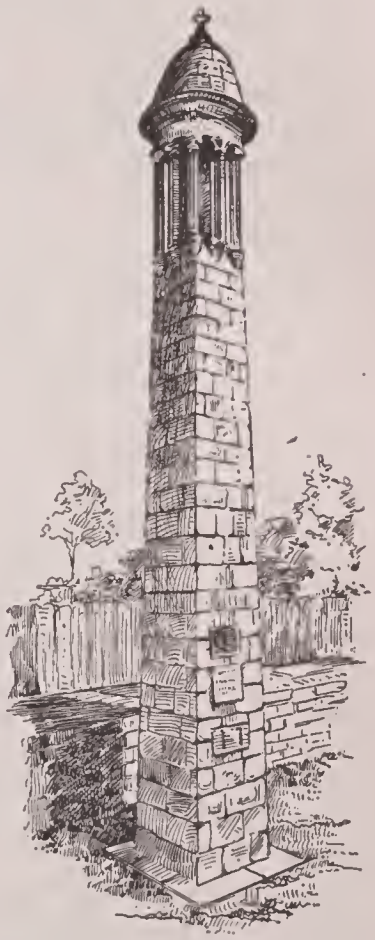
RIVERS

Amazon
Jurua
Madeira
Magdalena
Orinoco
Paraguay
Parana
Pilcomayo
Plata, Rio de la
São Francisco
Tapajos
Tocantins
Uruguay
Xingu

UNCLASSIFIED

Inca
Indians, American, subhead *South American Types*
Llanos
Patagonia
Selvas
Titicaca, Lake

**SOUTHAMPTON,** *south amp' tun,* a seaport in the extreme southern part of England, seventy-nine miles southwest of London. It occupies a peninsula lying between the estuary of the Test River on the west and the mouth of the Itchen on the east, where these waters discharge into Southampton Water, an inlet of the English Channel. Southampton is a coaling station, a port of call for several important mail steamship lines, and a fashionable seaside resort. In normal years 12,000 vessels annually enter its spacious, sheltered harbor, where double tides prolong each period of high water for three hours. There are six large dry docks here, and two coal-barge docks in which 10,000 tons of coal can be floated in one shipment. Industrial establishments include markets, slaughterhouses, shipbuilding yards and engine works. Public baths, a free public library and fine parks are among the attractive features of the town, which possesses also one of the oldest hospitals in England, the Domus Dei (God's House). A university college was established here in 1850. A Pilgrim Memorial Tower was erected here in Southampton in 1914; from Southampton the *Mayflower* set out on its perilous trip to the New World. Near the spot where the tower



TOWER TO THE PILGRIMS

From Southampton the *Mayflower* sailed, on August 20, 1620. The memorial tower is 100 feet high and is built of granite.

stands many historic events occurred. It was here that, according to tradition, Canute, the Danish king of England, commanded the waves to retire. From Southampton Henry V's army embarked for France just before the battle of Agincourt. Population in 1911, 119,012.

**SOUTH AUSTRALIA**, *aus tra' li a*, an agricultural state of the British Commonwealth of Australia, occupying 380,070 square miles in the south-central part of the continent and bordering on the Southern Ocean and the Great Australian Bight (see colored map, following page 488). It is a level or gently-undulating plain, broken by several mountain ranges. The western plains are semi-arid and treeless, but the mountain slopes are heavily wooded with the eucalyptus, sugar gum and Indian cedar. The coast is deeply indented and penetrated by gulfs and bays. The largest of these are Spencer and Saint Vincent's gulfs, separated by Yorke's Peninsula. Eyre's Peninsula lies between Spencer Gulf and the Great Australian Bight on the west. The Gulf of Saint Vincent is partly enclosed by Kangaroo Island, the longest island of Australia. There are few rivers, the only stream of importance being the Murray. The highlands are studded with shallow lakes which are numerous but not permanent.

LOCATION MAP

The shaded area to the north is Northern Territory, which until 1911 was a part of South Australia

The climate, though hot, is healthful and pleasant, as the average humidity is low. Along the south coast and in the highlands there is sufficient rainfall for agricultural purposes, but in the interior the annual precipitation is only from five to ten inches a year.

**People and Education.** According to the census of 1911 the population numbered 408,558; in 1914 it was estimated to be 438,173. The larger part of the inhabitants are of British or Australian birth; other Europeans include Germans and Scandinavians, and there are also several hundred Chinese.

There is no state Church, and the Church of England, though the largest denomination, has proportionally a smaller following than in any of the other Australian states. The other important religious bodies are the Roman Catholics, Congregationalists, Church of Christ and Salvation Army. There are also Jewish temples and Mohammedan and Confucian shrines.

Education is free, secular and compulsory. Much attention has been given to agricultural and technical training. Tree planting and nature study have been encouraged by the schools, and Arbor Day has been set aside as an annual holiday. There is a university at Adelaide, and also a state training school for teachers, a school of mines and an agricultural college.

**Industries.** Agriculture is the chief occupation. Large crops of wheat, barley, oats, hay and potatoes are raised in the south and east sections. Fruits, especially grapes from which quantities of wines are made, are extensively grown. Pastoral lands are leased by the government for the grazing of live stock. South Australia, however, is less devoted to pastoral pursuits than the other large states of the Commonwealth, and miles of arid grass-lands are being converted into vineyards, orchards and orange groves with the introduction of irrigation, water for which is furnished by artesian wells. The eastern mountain ranges produce copper, gold, silver and other minerals, and the first gold mine of Australia was in this state. Manufactures are few and unimportant.

**Transportation and Commerce.** Besides having 2,000 miles of state railway, South Australia is to be crossed by 450 miles of the Transcontinental Railroad which is to connect Brisbane on the east coast of Queensland with Freemantle on the west coast of the continent. Adelaide, the capital and largest city, is a great shipping center and is the third largest port of Australasia. The exports include fresh and dried fruits, wheat, flour, wool and copper.

**History and Government.** The first colony in this state was established near Adelaide by a private English company in 1836. It later became a Crown colony, but self-government was restored in 1856 when the present constitution was adopted. In 1901 South Australia joined the Commonwealth, to which, ten years later, it ceded the Northern Territory.

The state governor, appointed by the Crown, is assisted by an executive council of six ministers and the justice of the supreme court. There is a parliament, consisting of the legislative council and the house of assembly. The former consists of twenty members elected for six years by property owners, teachers, ministers, etc. The lower house is composed of forty-six members elected for three years by

universal suffrage, the vote having been extended to women in 1899. Justice is administered by the supreme and vice-admiralty courts and inferior courts. E.B.P.

Consult Blacket's *History of South Australia;* Cockburn's *South Australia,* in British Empire Series.

**Related Subjects.** The reader is referred to the following articles in these volumes:

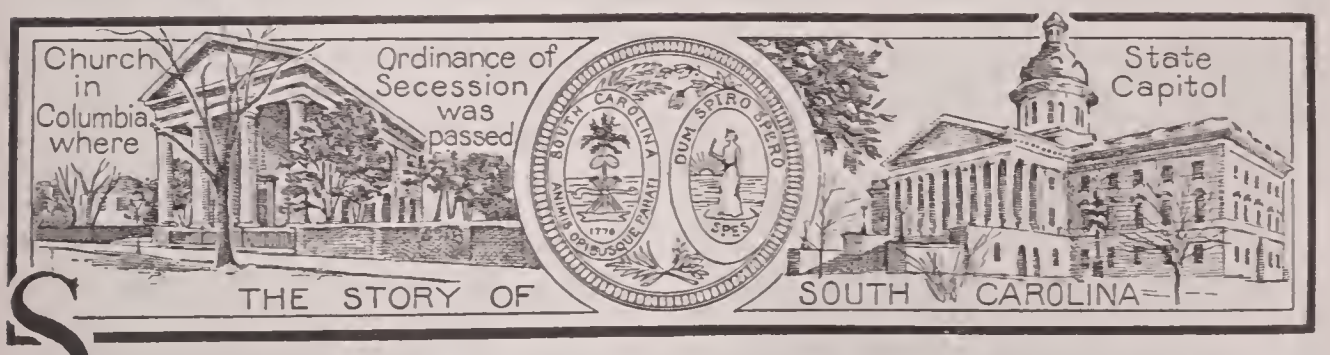
| | |
|---|---|
| Adelaide | Great Australian Bight |
| Australia | Murray River |

**SOUTH BEND,** IND., the county seat of Saint Joseph County, situated in the north-central part of the state on the south bend of the Saint Joseph River, eighty-six miles southeast of Chicago. Railroad lines entering the city are the Grand Trunk, the Michigan Central, the New Jersey, Indiana & Illinois, the New York Central, the Lake Erie & Western and the Vandalia. South Bend has electric interurban service. The population, which was 53,684 in 1910, had increased to 68,946 in 1916 (Federal estimate). The area is more than fourteen square miles. Two miles north of the city is the University of Notre Dame. Prominent features of South Bend are the Federal building, courthouse, city hall, public library, two public hospitals and city parks. The city has a large trade throughout a rich farming section, and is the home of two firms of international repute, the Studebaker Wagon Works and the Oliver Plow Company. In addition, there are manufactories of varnish, sewing machines, watches, automobiles and a great variety of other articles. According to local estimate, the value of the annual output is $60,000,000.

The site of South Bend was once occupied by a Miami Indian village; later it was the home of the Potawatomi tribe. The place was visited by French trappers and missionaries, and in 1824 a fort was established by Alexis Coquillard. An old Indian portage once passed where the city now stands. The town was incorporated in 1835 and became a city in 1865.

**SOUTH BETH'LEHEM,** PA., a city in Northampton County, in the east-central part of the state, and on the south bank of the Lehigh River, opposite Bethlehem. It is served by the Lehigh Valley Railroad and by electric interurban lines. South Bethlehem contains the Lehigh University, Bishopthorpe Manor (a seminary for girls), Moravian Ladies Seminary, Moravian College (theological), Sayre and Lehigh University parks, Saint Luke's Hospital and public library. The erection of a $100,000 Federal building was begun in 1916. Iron and steel works, foundries and machine shops, knitting mills, zinc and brass works, and manufactories of silk and furniture are the leading industrial establishments. The output of the city's industries is sometimes over $26,400,000 a year. South Bethlehem was settled in 1742 and became a city in 1865. In 1910 the population was 19,973; in 1916 it was 24,204 (Federal estimate).

**SOUTHBRIDGE,** MASS., a township in Worcester County in the south-central part of the state, twenty-one miles southwest of Worcester. It is on the Quinebaug River and on a branch of the New York, New Haven & Hartford Railroad and interurban lines. The city has a town hall, public library, Y. M. C. A. building and Notre Dame Church, and important manufactories of optical goods, woolen and cotton goods, knives, shuttles and cutlery. Southbridge was incorporated as a township in 1916. The population, which in 1913 was 12,592, was 14,217 by the state census of 1915. The area is twenty-one square miles.




**SOUTH CAROLINA,** *kair o li' na,* the smallest of the Southern states, distinguished for its aggressive and important part in United States history at a critical time. It was one of the thirteen original members of the Union, and at all times has been true to its motto—"Ready in soul and resource." The state belongs to the South Atlantic group, and is popularly known as the PALMETTO STATE. It has never adopted a state flower.

**Size and Location.** Lying on the Atlantic coast, between North Carolina on the north and Georgia on the south, the state covers a triangular area of 30,989 square miles, of which 494 square miles are water. It is about seven times the size of the state of Connecticut and ranks thirty-ninth in area among the states.

**People.** With the exception of Mississippi, South Carolina is the only state in the Union in which the colored population exceeds the white. In 1910 the total number of inhabitants was 1,515,400; of these 835,843 were negroes. In 1914 the negro population exceeded the white by 165,813. The total number of inhabitants January 1, 1917, was estimated to be 1,634,340. There is a very small percentage of foreigners. Over four-fifths of the population live on farms and plantations or in rural villages. Charleston is the only city having a population of over 50,000. Other large cities are Columbia, the capital, Spartanburg, Greenville, Anderson and Sumter, each of which is described under its title.

The Methodist and Baptist denominations are the largest, followed by the Presbyterian, Lutheran, Roman Catholic and Episcopal bodies.

**Education.** The predominance of the negro population has presented great difficulties in the matter of organizing an efficient educational system, and the illiteracy in the state is greater than in any of the other commonwealths but Louisiana. However, the fact that these problems are being handled successfully is shown in the statement that the illiteracy decreased from 35.9 per cent in 1900 to 25.7 per cent in 1910. The present system was established in 1868, but the high schools were not organized until 1907. Public education is administered by a state superintendent and a board of education consisting of the governor and seven members appointed by him. School attendance was not compulsory until 1915, but there had been a law prohibiting the employment of illiterate children in factories and mines. Separate schools are provided for all colored pupils.

The Normal Industrial, Agricultural and Mechanical College for the colored at Orangeburg, the Winthrop Normal and Industrial College at Rock Hill, the state university at Columbia, a military academy at Charleston, and Clemson Agricultural College at Clemson are maintained by the state. There are many other institutions of higher education, including Charleston City College, Erskine College at Due West, Wofford College at Spartanburg, Newberry College at Newberry, Presbyterian College of South Carolina at Clinton, and Furman University at Greenville; for the colored, there are Allen University and Benedict College at Columbia, Claflin University at Orangeburg, Ferguson-Williams College at Abbeville, Friendship College at Rock Hill, Harbison College at Erno and Vorhees College at Denmark.

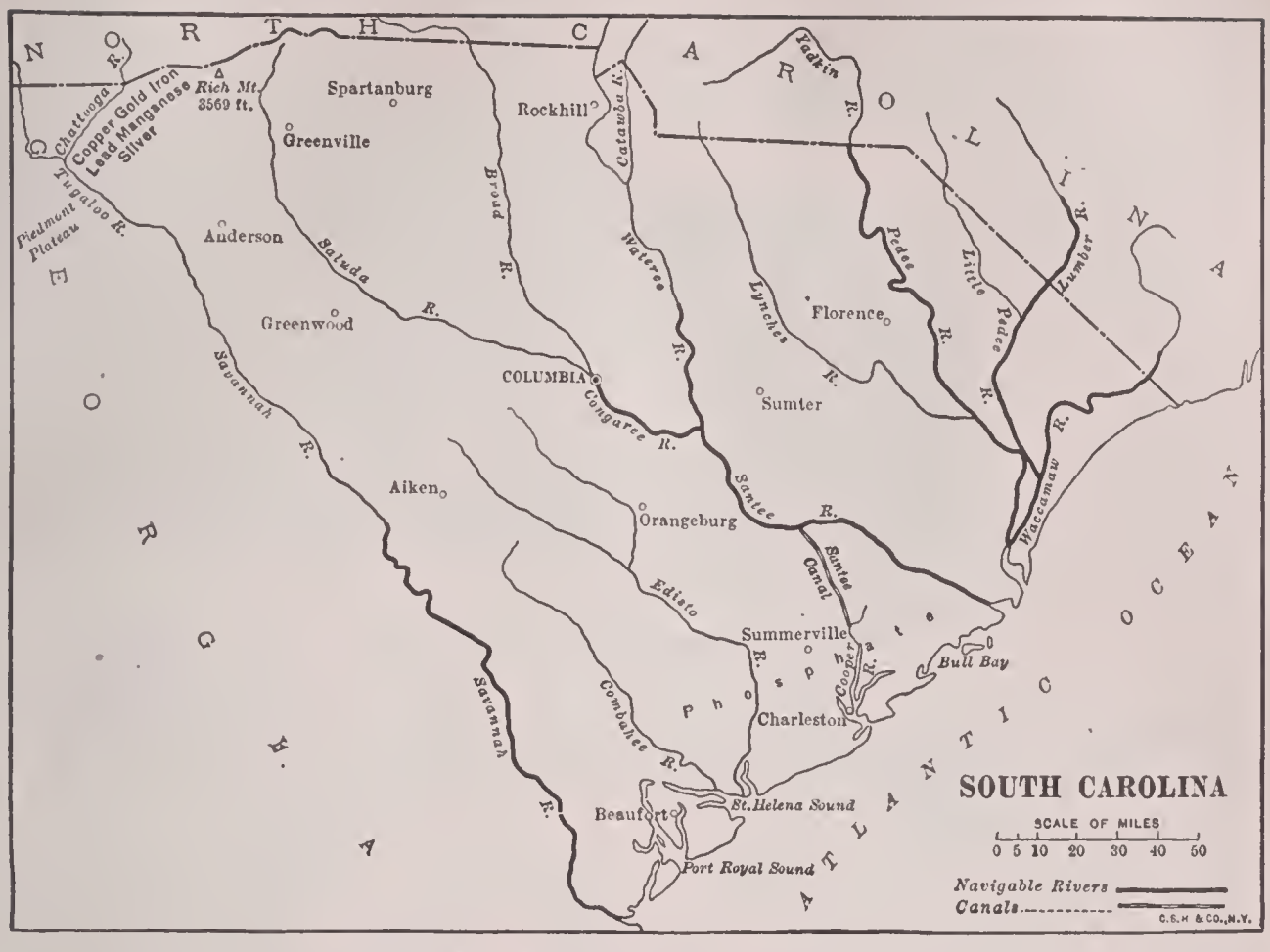
**Charities and Corrections.** A state board of charities and corrections was created in 1915. The public institutions for the dependent, defective and delinquent include an asylum for the insane, a Confederate infirmary, a reformatory for negro boys and a penitentiary, all at Columbia; an industrial school at Florence; an institution for the deaf, dumb and blind at Cedar Springs. There is a state tuberculosis sanitarium, but it is not a charitable institution. In 1913 contract labor was abolished in the penitentiary. There was notable legislation in 1915 relating to the care of the insane, and an appropriation of $600,000 for a period of four years was provided.

**The Land.** Except for a short distance in the north, the wide coastal plain is bordered by low islands, penetrated by winding creeks.

> "Sinuous southward and sinuous northward, the shimmering band
> Of the sand beach fastens the fringe of marsh to the folds of the land."

Along the southern coast there are dense groves of palmettos and magnolias. The vast marshes of reeds or of live oaks, gum trees and cypress, draped with moss and interwoven with vines, meet a sandy region known as the *Pine Barrens,* which rises gradually to the broken valleys and wooded uplands of the Piedmont plain, the western section of the state. This section rises abruptly above the coastal plain, and its forest-clad ridges reach an elevation of 1,000 feet in the northwest, where they meet the wooded foothills of the Blue Ridge Mountains. These beautiful hills and mountains are covered with a luxuriant undergrowth of azaleas, honeysuckle and jessamine, and echo with the songs of orioles, mocking birds and vireos. Their loftiest peaks, Rich Mountain (3,569 feet), Mount Pinnacle and Caesar's Head, rising about 3,000 feet, are in the northwest corner, where the Blue Ridge Mountains form the boundary with North Carolina. This region is the summer resort of the state.

**Rivers.** The northeast corner of the state is drained by the Great Pedee, which is fed by the Little Pedee, Waccamaw and Lynches rivers, and empties into Winyah Bay at George-




OUTLINE MAP OF SOUTH CAROLINA

Showing boundaries of the state, navigable rivers, chief cities, location of mineral deposits and the highest point of land.

town. It rises in the coastal plain, as does the Edisto, which flows into Saint Helena Sound. The Santee and the Savannah, the largest rivers, rise in the Piedmont uplands and flow southeast to the coast. The Santee is fed by the Wateree, Broad, Saluda and Congaree rivers, and the Savannah forms the entire southwest boundary with Georgia. At the fall line, along the eastern edge of the Piedmont plain, these rivers and numerous other mountain streams make an abrupt and rapid descent, developing a vast amount of water power, used by cotton mills and other factories. In the coastal plain they become sluggish; the tides push up their channels for fifteen to thirty miles and overflow the surrounding rice fields.

**Climate.** The mild climate of South Carolina resembles that of Southern Greece and Italy. Although it is almost tropical in the south, and the swamps are malarial and unhealthful, the uplands and mountain region are especially healthful and delightful. The average temperature for January is 45°, and for July 80°. Along the coast the climate is more equable than in the interior. In the northern mountains, temperatures below zero have been recorded, and at Columbia the mercury sometimes rises to 106°. The annual rainfall, averaging forty-nine inches, is heaviest during the summer months, but it is fairly evenly distributed throughout the state. Snow occasionally covers the mountains and uplands, but in the south and east sections it is rarely seen. The coast frequently is swept by severe West Indian hurricanes, which damage shipping and vegetation.

## *Sources of the State's Wealth*

**Agriculture.** The climate and soil of South Carolina are suitable for all plants of the subtropical and temperate zones, and much of the state is farm land. Cotton is by far the most important crop. In 1915 the state was surpassed only by Texas and Georgia in the amount produced, though usually Alabama, which devotes a million acres more to cotton, stands third. The crop for 1915, as in all of the states, was considerably less than that of the preceding

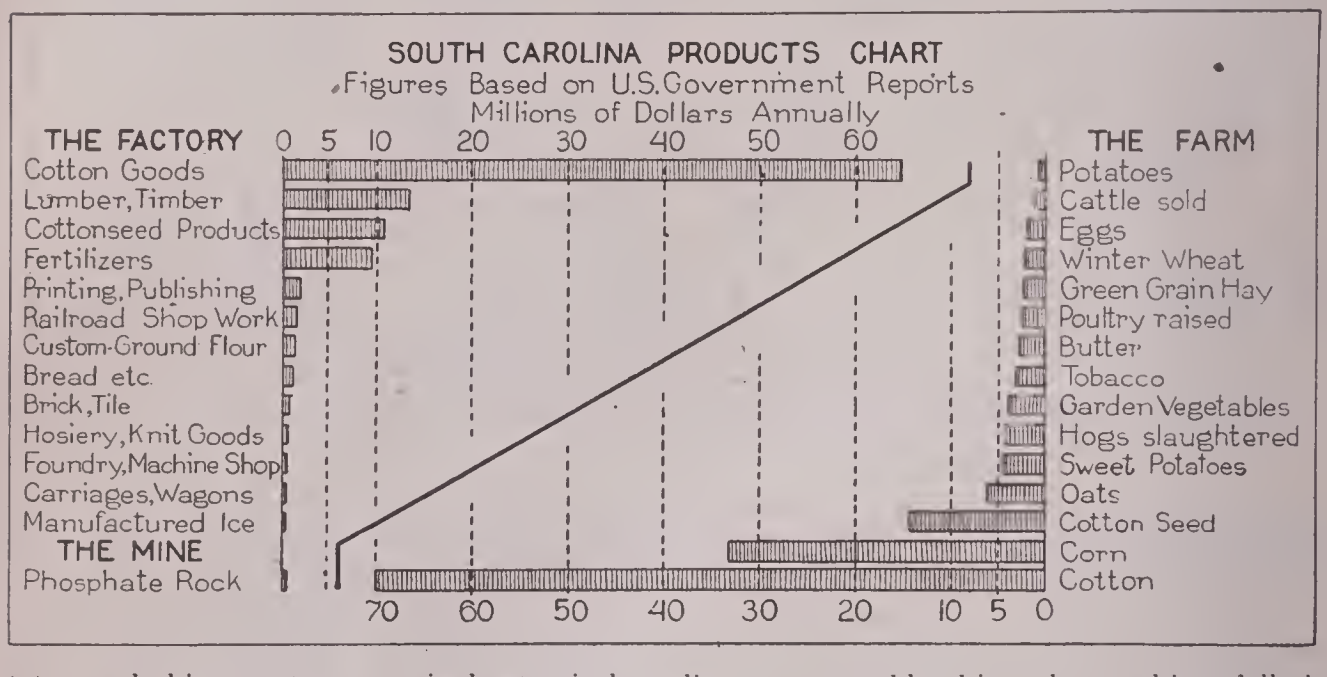
year, though the yield per acre was above the average. Much sea-island cotton, the long fibers of which make it the best quality in the world, is grown on the low islands of the South Carolina coast.

Rice, which in the early part of the last century was the principal crop, and in which the state outranked all others in the Union, has decreased in importance. In 1859 South Carolina produced 64 per cent of the rice of the United States; in 1899, 19 per cent; in 1909 only 2.5 per cent, and in 1915 less than one-third of one per cent; this was in part due to large increase in production elsewhere. The large cereal crop of the state is corn; oats and wheat are also important. Tobacco, sweet potatoes and white potatoes are raised extensively, and truck farming is important in the coastal plain. Peaches, apples, pears, cherries and a few apricots and quinces are cultivated in the uplands, and figs, pecans and some oranges, lemons and other tropical fruits are grown in the southeastern section. Persimmons, plums and grapes grow wild in great profusion. In 1915 South Carolina ranked twenty-second among the states in the value of crops.

About sixty-eight per cent of the area of the state is woodland. The most important timber products are yellow pine, cypress and turpentine, rosin and tar from the turpentine farms in the "Pine Barrens." The latter products are decreasing, owing to the exhaustion of the pine timber supply.

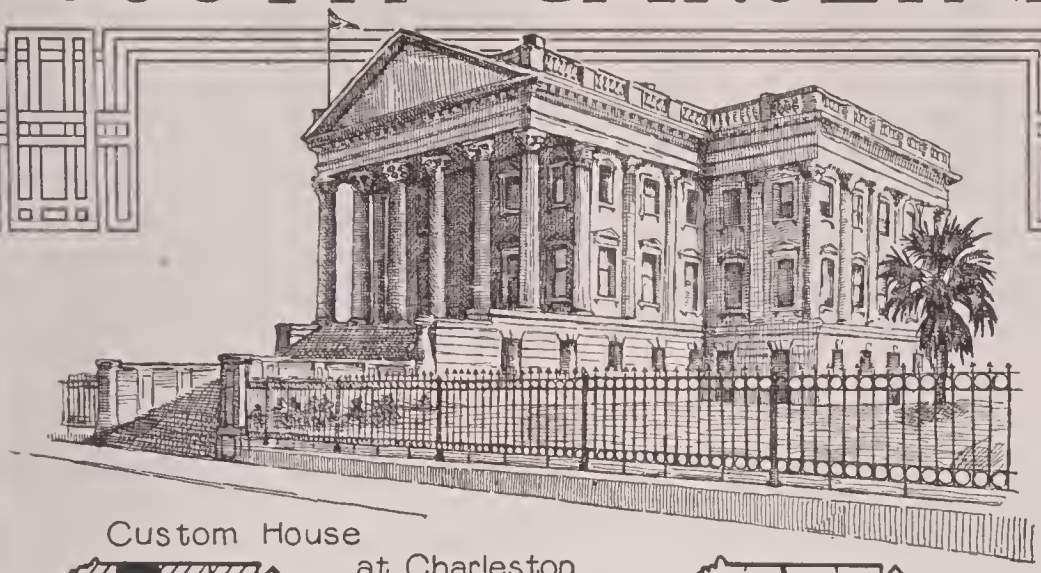
**Fisheries.** The numerous bays and salt-water creeks of the coast contain extensive oyster beds, and oysters are the most important sea product of the state. Whiting, shad, sea bass, sturgeon, crabs and many other fish are abundant in these tidal waters, and some pike, perch, catfish and trout are caught in the inland streams.

**Mining.** The most important of South Carolina's varied but not extensive minerals was long phosphate rock, a belt of which extends seventy miles along the coastal plain. This rock contains fifty-five to sixty-one per cent of phosphate of lime and is quarried both in the river beds and in the bordering banks. The clay of the coastal plain and east section of the Piedmont plateau now surpasses phosphate rock in importance. Granite and mica are quarried in the western mountains, and to a slight extent gold, silver and copper are worked. Talc, limestone, marble, bismuth, graphite, fuller's earth and brown coal are found, but are not commercially important.

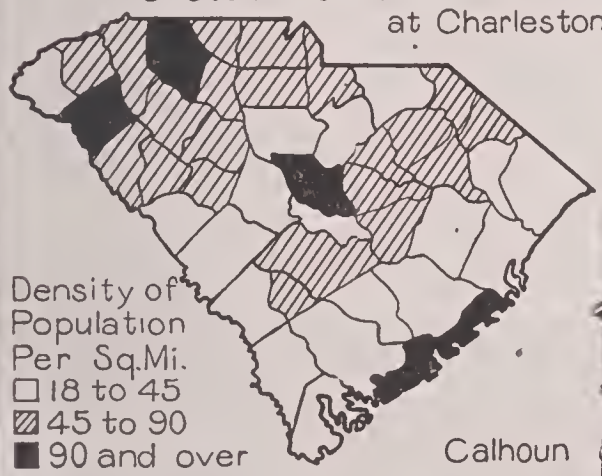


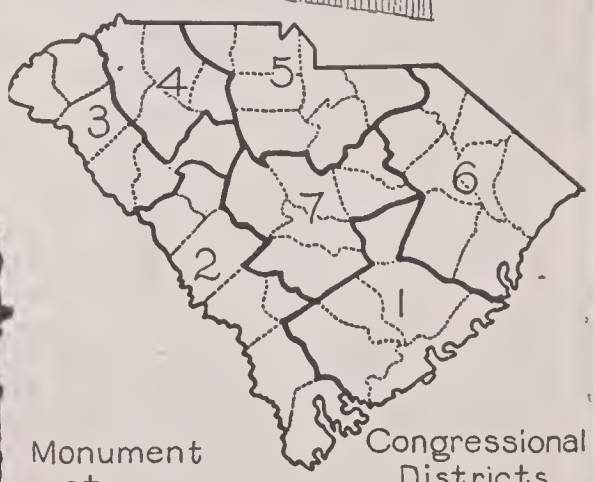

**Manufactures.** Although South Carolina is preëminently an agricultural state, its manufactures are developing rapidly, especially those related to agricultural pursuits. The abundance of material and water power and the excellent transportation facilities have been of chief importance in the development of industries. The predominant manufacturing interest is the weaving of cotton goods, in which South Carolina ranks third among the states, being surpassed only by Massachusetts and North Carolina. The value of cotton goods is over half the total value of the manufactures of the state. Lumber and timber products, cotton-seed oil and cake, and fertilizers made from the phosphate rock are the other chief manufactures. South Carolina now ranks thirty-first among the manufacturing states.

# SOUTH CAROLINA

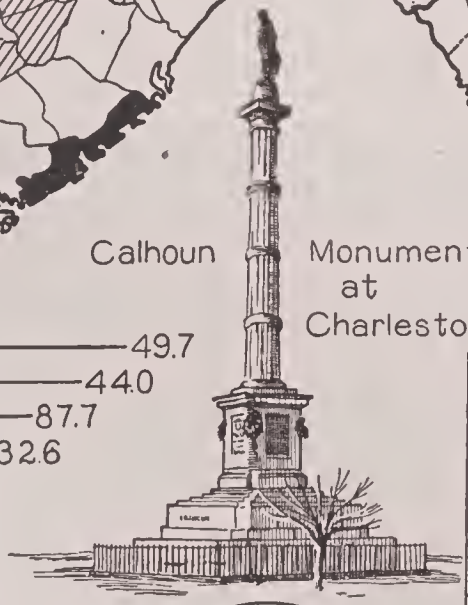


Custom House at Charleston



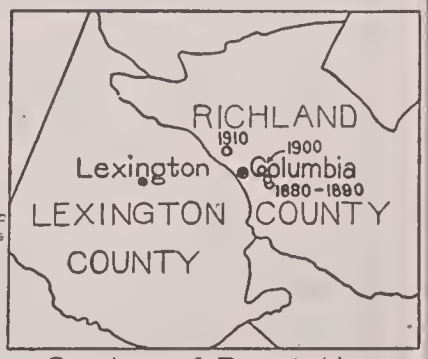

Congressional Districts



Calhoun Monument at Charleston

| | |
|---|---|
| 1910 | 49.7 |
| 1900 | 44.0 |
| 1890 | 37.7 |
| 1880 | 32.6 |
| 1870 | 23.1 |
| 1860 | 23.0 |
| 1850 | 21.9 |
| 1840 | 19.4 |
| 1830 | 19.0 |
| 1820 | 16.4 |
| 1810 | 13.6 |
| 1800 | 11.3 |
| 1790 | 8.1 |

Population Per Sq. Mi. By Decades




Center of Population

University of South Carolina, Columbia

**Transportation.** The railroad accommodations of South Carolina are unusually good. In 1915 there were 4,466 miles of railway in the state, the greater part being operated by the important trunk lines of the South, the Southern, the Atlantic Coast Line and Seaboard Air Line. There are also many shorter roads connecting with these main lines and over 100 miles of electric road. There are over 4,500 miles of improved road within the state.

The larger rivers are navigable by steamboats as far as the fall line, and the construction of two or three short canals would extend navigation to the western border. Canals have been proposed which would afford navigation beyond the Savannah and across Florida to the Gulf, opening a safer and shorter route to Panama. Charleston is one of the important seaports on the Southern Atlantic and is one of the greatest cotton ports of international trade. At Georgetown, on Winyah Bay, there is another important commercial harbor.

Charleston, Beaufort and Georgetown are ports of entry (see PORT OF ENTRY).

## *Government and History*

**Government.** South Carolina has had six state constitutions; the present one was adopted in 1895. Amendments may be proposed in either house of the legislature, and if approved by two-thirds of the members of each house they are submitted to the voters. If accepted by a majority of the voters and the next general assembly, they become effective. Constitutional conventions may be called when voted for by a two-thirds majority in each house and a majority of state electors. In an attempt to restrict the negro vote strict qualifications for voters have been demanded. Only those male citizens are entitled to vote who are able to read and write any section of the Constitution; who have paid all taxes for the preceding year on property worth $300 or more; have lived in the state two years (ministers and teachers of public schools excepted), in the county one year and in the precinct four months, and have paid a poll tax six months previous to elections. Idiots, paupers, convicts and the insane are disqualified.

The *legislative power* is vested in a general assembly which consists of a senate and house of representatives. There are forty-four senators, half of the number being elected every two years, and 124 representatives, elected for two years. The legislature meets on the second Tuesday of each January.

The *executive department* consists of the governor, lieutenant-governor, secretary of state, comptroller-general, attorney-general, treasurer, adjutant and inspector-general and superintendent of public instruction, all of whom are elected by the people for two years. An insurance commissioner is elected by the general assembly for two years, a commissioner of agriculture is appointed by the governor and three railroad commissioners are elected for terms of two, three and four years each.

The *judicial power* is vested in the supreme court, circuit courts, courts of common pleas and general sessions. The chief justice of the supreme court and three associate judges are elected by a *viva voce* vote in the general assembly for terms of eight years. Eight circuit judges are elected in the same manner for four years, and justices of the peace are appointed by the governor.

The state constitution is peculiar in that it contains numerous provisions for the prevention of lynching and in being the only state constitution which prohibits divorce upon any cause. Since January 1, 1916, state-wide prohibition has been in force.

**Colonization and Proprietary Government.** South Carolina was visited by Spaniards from Cuba in 1520. In 1562 the French settled at Port Royal, but soon abandoned the settlement. About a hundred years later, Charles II of England, claiming the territory through discoveries in North America by Cabot, granted the tract including the Carolinas and extending as far west as the Pacific to a company of eight Lord Proprietors. The first permanent settlement was made at Charleston in 1670. The early history of the colony is a story of continuous struggle between the people and the Proprietors. The "Fundamental Constitution," framed by John Locke, outlined an impractical, obsolete feudal system which established the foundation of a slave-holding aristocracy and aroused the discontent of colonists, ending in the overthrow of the proprietary government in 1719. North Carolina and South Carolina, though a single province, had separate governors after 1712. See NORTH CAROLINA.

**Royal Government.** As a Crown colony the contests between the popular legislature and the royal governor and council continued. The spirit of democracy grew, and delegates were

# *RESEARCH QUESTIONS ON SOUTH CAROLINA*

**(An Outline suitable for South Carolina will be found with the article "State.")**

What would be the cost of a South Carolina farm of average size, at the average price per acre?

Is the greatest altitude of this state higher or lower than the loftiest point of North Carolina? Of Georgia?

How have the relative values of the mineral products of the state changed within the last few years?

What remarkable record did the colony make as regards money contributions during the Revolutionary War?

In what particular do the fisheries of South Carolina resemble those of Maryland?

What eminent English philosopher had a part in drawing up the early instrument of government for the colony?

What change has been made within recent years in the method of treating convicted criminals?

How large a part of the area is under forests? How does the state compare in this respect with Georgia? With Arkansas?

Upon what did England base its claim to this region? Where was the first English settlement made?

Why has the educational problem in this state been unusually difficult? What indication is there that the difficulty is being overcome?

Of what crop in which the state long outranked all others does South Carolina now produce less than one per cent?

How has the negro vote been restricted without any direct mention of the negro?

How old is the present state constitution? How many constitutions had the state before the present one?

How does the state compare in number of inhabitants to the square mile with each of its bordering states? With the country as a whole?

How does South Carolina rank among the states with respect to its production of its most important crop?

What is the "fall line," and how can you trace it on a map on which it is not specifically indicated? See FALL LINE.

How many of the states are larger than South Carolina? How many of these larger states have a greater population?

How does the state compare in latitude with the European countries which it most resembles in climatic conditions?

What is the railroad mileage to each hundred square miles of area? How does South Carolina compare in this respect with the other Atlantic coast states?

What distinction did the state have in respect to the War of Secession? Who were the "carpetbaggers," and what harm did they do?

From what two great disasters did the state suffer in the late nineteenth century?

What is the state motto? How has South Carolina proved its right to this motto?

What is the popular name of the state? Describe the tree to which it has reference.

Of what advantage is it to a state to have a "fall line" distinctly marked?

What prohibition is contained in the constitution which is not to be found in that of any other state?

sent to the Stamp Act Congress and to the Continental Congress. The royal government was overthrown, and a state constitution was framed in May, 1776.

**Statehood.** South Carolina took an aggressive part in the Revolution, contributing more money than any other colony except Massachusetts, and as much as the other eleven combined. It also furnished many famous soldiers, among whom were Sumter and Marion. Because of its large number of Tory colonists, South Carolina was torn by bitter feeling and local conflict. Charleston and Fort Moultrie were attacked by the British, and after the surrender of the latter, the state was overrun by the English troops. Notable battles in South Carolina were Camden, King's Mountain, Hobkirk's Hill and Eutaw Springs.

After much discussion the Federal Constitution was ratified in 1788, and South Carolina became the eighth of the thirteen original states. The political conflicts were continued between the "low country," or rich planter faction, and the Scotch-Irish settlers of the "up country." The state was strongly anti-Federalist, and ardently advocated states' rights and free trade. In 1832, when the Clay Tariff Act was passed by Congress, South Carolina passed the Ordinance of Nullification, declaring the act null and void in the state, and secession was averted only by compromise. Under the leadership of John Calhoun, South Carolina became the spokesman of the South and the champion of slavery.

It was the first state to secede from the Union, and the first battle of the War of Secession was fought at Fort Sumter, within its borders. The white population was small, but over 60,000 men joined the Confederate army. Although the state suffered heavy losses during the war, the period of reconstruction was even more disastrous. During the "Carpetbag" government of Northern adventurers and negro politicians, crime and corruption were rife. The "Ku-Klux Klan," which had spread over the South for the purpose of suppressing negro power, had become lawless. The state had refused to ratify the Fifteenth Amendment, but had given the negro suffrage. In 1868 a new constitution was adopted, and the state was readmitted into the Union.

On May 31, 1886, much of Charleston was destroyed by a severe earthquake, and in 1893 the state suffered another disaster when the coast was swept by a tidal wave. The remarkable progress in industry and commerce made since the War of Secession by this and the other South Atlantic states was seen in the South Carolina Interstate and West Indian Exposition, held at Charleston in 1901-1902.

**Other Items of Interest.** The constitution denies the right to hold any state office to any person who does not believe in the existence of a Supreme Being.

The first printing press within the territory was set up in 1730, and two years later the first newspaper, the *South Carolina Gazette*, was established.

The clay yielded by South Carolina is chiefly of two kinds—that used for common brick and the "paper clay" used in the manufacture of paper.

The Edisto, 150 miles in length, is the longest river entirely within the state. It is navigable throughout its length for boats of light draft.

It is evident to geologists from certain features that the entire low region of the state was once under water. The old shore line ran through Columbia and Camden.

The average size of a South Carolina farm is 76.6 acres; the average value about $20 an acre. E.B.P.

Consult Watson's *Handbook of South Carolina:* McCrady's *The History of South Carolina:* White's *Making of South Carolina.*

**Related Subjects.** The following articles in these volumes will give much additional information about South Carolina:

CITIES

| | |
|---|---|
| Anderson | Greenville |
| Charleston | Spartanburg |
| Columbia | Sumter |

HISTORY

| | |
|---|---|
| Calhoun, John C. | Ku-Klux Klan |
| Carpetbaggers | Nullification |
| Fort Moultrie | Reconstruction |
| Fort Sumter | States' Rights |

LEADING PRODUCTS

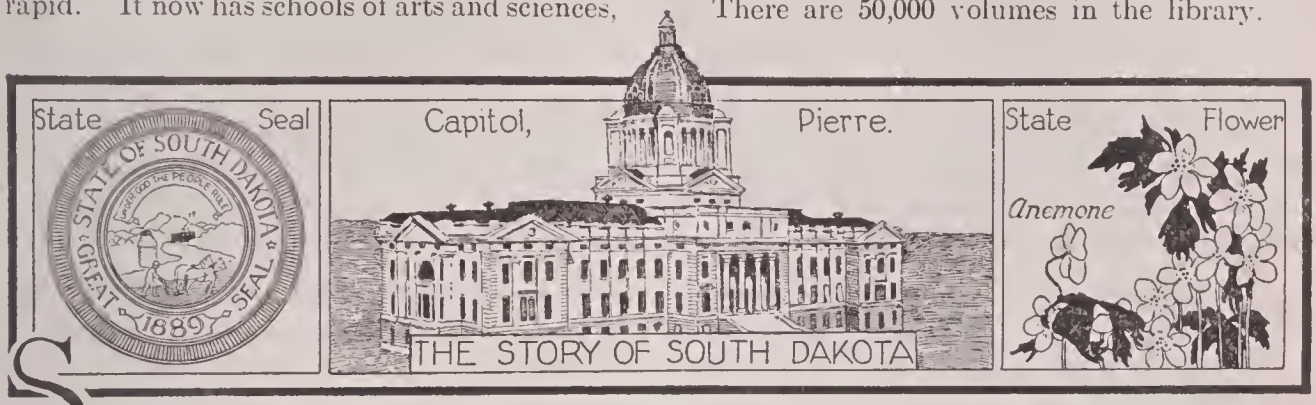
| | |
|---|---|
| Corn | Oyster |
| Cotton | Tobacco |

PHYSICAL FEATURES

| | |
|---|---|
| Blue Ridge | Savannah River |
| Piedmont Region | |

**SOUTH CAROLINA,** UNIVERSITY OF, a coeducational state institution located at Columbia. It was chartered by the general assembly in 1801 and opened in 1805 as the College of South Carolina. It prospered until the time of the War of Secession, when its halls were used first by the Confederates, then by the Union army, as a hospital. After the war the school was reopened, but was forced to close until

conditions in the state had had time for readjustment. The institution was organized in 1880 as a college, and in 1887 as the University of South Carolina. Since the last reorganization in 1906, the growth of the school has been rapid. It now has schools of arts and sciences, law and engineering, a school for teachers and a graduate school. The university conducts extension courses by lectures and by correspondence. There are over forty faculty members, and the student registration is nearly 600. There are 50,000 volumes in the library.




SOUTH DAKOTA, popularly known as the SUNSHINE STATE, one of the north-central states of the American Union. It lies partly within the great central prairies of the United States and contains a region of noted beauty and mineral wealth in the famous Black Hills. The name Dakota is the North American Indian word meaning *allies,* and refers to the allied Indian tribes, or Sioux Confederation, which occupied that territory. The flower emblem of the state is the pasque flower, an anemone.

**Size and Location.** The state lies between North Dakota and Nebraska, and covers a rectangular area of 77,615 square miles, of which 747 square miles are water. It is larger than all of the New England States together, or as large as Ohio and Indiana combined, and among the states of the Union ranks fourteenth in size.

**The People.** In 1910 South Dakota, with 583,888 inhabitants, ranked thirty-sixth in population among the states. About one-sixth of the inhabitants are of foreign birth, chiefly German, Scandinavian, Russian and Irish. There are over 20,000 Indians confined upon the six state reservations—Standing Rock and Cheyenne River reservations in the north, Crow Creek and Lower Brule River reserves in the central section, and the Rosebud and Pine Ridge districts in the south. On January 1, 1917, the population of the state was estimated to be 707,740. Fewer than one-fifth of the inhabitants live in towns and cities; the only cities with a population of more than 10,000 are Sioux Falls and Aberdeen. Other important towns are Lead, Watertown, Huron, Mitchell, Yankton and Pierre, the capital. See *Related Subjects,* at end of article.

The largest of the religious bodies is the Roman Catholic, other denominations of importance being the Lutherans, Methodists, Congregationalists, Episcopalians, Presbyterians and Baptists.

**Education.** A well-organized system of rural and city elementary and high schools is supervised by the state superintendent of public instruction and a board of five regents appointed by the governor. Under their direction are county superintendents and district boards of education. A large, permanent school fund is derived from the sale of land, two sections of which are set aside in each township for school purposes.

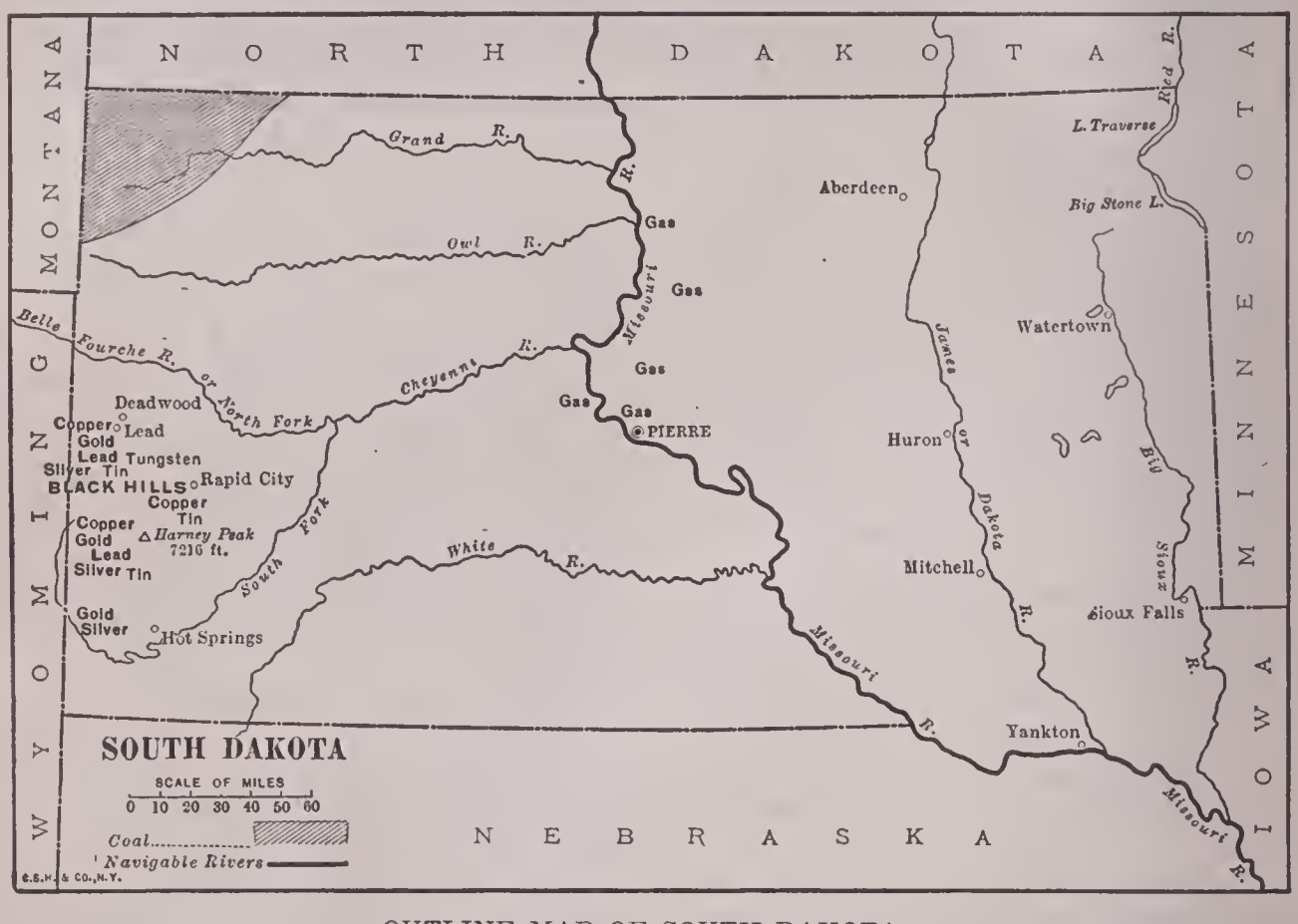
School attendance is compulsory for a specified number of weeks each year for all between the ages of eight and fourteen years, Indians included. The low illiteracy of the state, averaging 2.9, is the same as the general average for the west north-central states. Normal schools at Spearfish, Madison, Aberdeen and Springfield; the state university at Vermilion, an agricultural college at Brookings, and a school of mines at Rapid City are maintained by the state.

A board of five members, appointed by the governor, controls state institutions of charity and correction, which include a tuberculosis sanitarium at Custer; a school for the blind at Gary; an insane asylum at Yankton, where there is also a Federal hospital for insane Indians; an institution for the feeble-minded at Redfield; a reformatory at Plankinton; a soldiers' home at Hot Springs; the penitentiary and schools for the blind, deaf and dumb at Sioux Falls. The honor system is in force in the penitentiary and about forty per cent of the prisoners work outside of the prison. Free-

dom to talk at meals and during the Sunday social hour is granted, and moving picture shows are given for the prisoners.

**The Land.** South Dakota is an undulating plain, rising from the level prairie region of the east to the rough plateaus and buttes of the Black Hills. These hills and mountains, covered with dense, dark, pine forests, are cut by the magnificent canyons of the North Fork of the Cheyenne River and many mountain streams. Jagged peaks and domelike summits, open parks, thick forests, fantastically shaped sandstone, which have the appearance of gigantic mushrooms. Most of the region is bare clay of different colors, tan, gray, cream or pale green, but some of the hollows and flat-topped mesas are covered with grass and are used for grazing. Smaller districts of Bad Lands border the Grand, Moreau and Owl rivers.

The eastern prairies are broken in the north by rounded, wooded hills called the Coteau des Prairies. The central portion of the state is crossed by a table-land known as the Coteau




OUTLINE MAP OF SOUTH DAKOTA

Showing boundaries, navigable rivers, chief cities, extent of coal measures, location of gold, silver, lead, copper, tungsten and tin mines, and the highest point of land in the state.

pinnacles and mesas, caves and lakes afford scenery notable for its wild and weird beauty. Crystal and Wind caves, Spearfish Canyon, Cathedral Park and the fossil remains at the base of Matties Peak are especially noteworthy. In these hills Harney Peak, the highest point in the state, rises 7,216 feet.

There are many isolated clusters of hills in the western and central sections, which are strangely shaped by wind and rain (see EROSION). Bordering the White River for 120 miles, in the southwest corner of the state, are South Dakota's noted Bad Lands, a maze of curiously-carved ridges and clay mounds from which rise grotesque pinnacles and columns, capped with

du Missouri. The lowest part of the state lies along the shores of Big Stone Lake on the Minnesota border, where the land is 970 feet above sea level.

**Rivers and Lakes.** The Missouri, crossing the central section of the state in a southeasterly direction, is South Dakota's largest river. Near the eastern border it is joined by the James River, which rises in North Dakota. Another tributary, the Big Sioux, forms the boundary between South Dakota and Iowa. The Grand, Owl, Cheyenne and White rivers rise in the hills of the extreme western part of the state and flow east through deep, narrow canyons to the Missouri. The largest of these

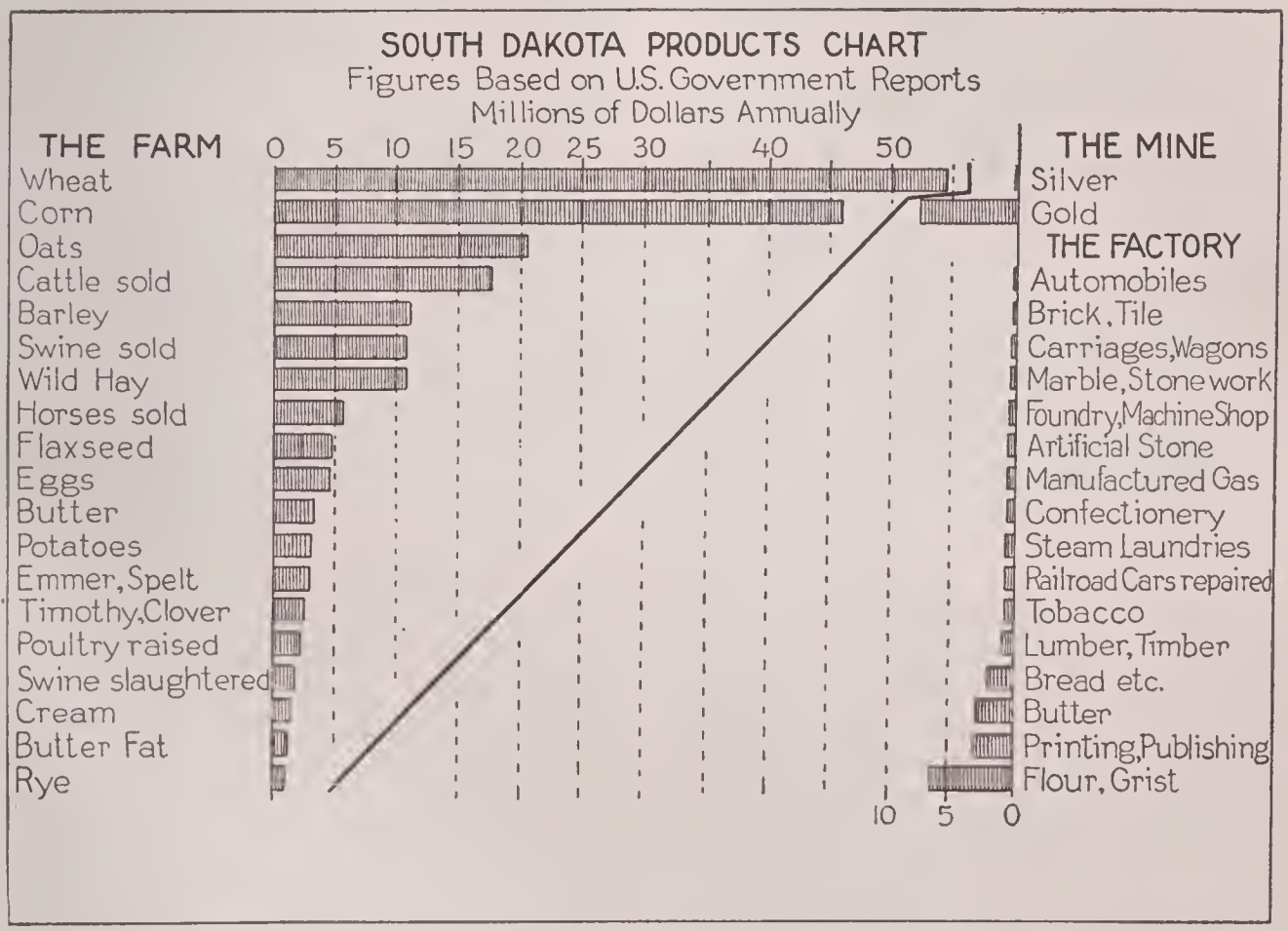
is the Cheyenne, dividing into the North Fork, or Belle Fourche, and the South Fork, which encircles the Black Hills. The extreme northeast corner of the state is drained by the Minnesota River, through Big Stone Lake.

This lake and Lake Traverse are long, narrow bodies of water forming part of the eastern boundary with Minnesota. The eastern prairies of South Dakota are dotted with many ponds and small lakes. Sylvan Lake, in the Black Hills, is a popular resort. The valleys of the James and Missouri rivers are underlaid with water which comes to the surface in hundreds of artesian wells, there being over a thousand of them east of the Missouri River.

**Climate.** South Dakota is noted for its cloudless skies, and no northern state has more days of sunshine. The climate is dry and is characterized by a wide variation in the annual temperature. The average yearly temperature is about 44°, which is higher than that of either Minnesota or New Hampshire, in the same latitude. The coldest part of the state is in the northeast, and the warmest region is in the southwest. The cold of the long winters is not keenly felt because of the lack of humidity. Snows are light and cattle graze in the open prairies during most of the winter. However, there are occasional blizzards, accompanied by high winds and severe cold. The annual rainfall averages twenty inches. It is heaviest during the summer months, and the greatest amount falls in the eastern river valleys and the extreme north-central and northwest parts of the state.

**Agriculture.** South Dakota is an agricultural state. The abundance of sunshine, the rich soil and the plentiful rainfall of the eastern river valleys are all favorable to the production of large crops of wheat, and in the output of spring wheat the state is surpassed only by North Dakota and Minnesota. For several years preceding 1917 South Dakota ranked fifth among the states in the output of wheat. Other cereals raised in large quantities include corn, oats and barley. Quantities of flaxseed, hay and vegetables, particularly potatoes, are grown, and apples, plums and cherries are extensively cultivated. Large herds and flocks graze in the central and western prairies, and stock raising and dairying are important industries.

There are fringes of timber along the streams and a few planted groves in the east, but the only extensive forest area is in the Black Hills. Here there is a forest reserve of 1,893 square miles. Since 1913 a bounty has been provided



for the planting of forest trees. The national forests of South Dakota, embrace 1,129,208 acres, in the Black Hills region.

*Irrigation.* The irrigated area is chiefly confined to the Black Hills region, and the Belle Fourche and Owl Creek supply the largest systems. Where irrigation is needed in the eastern section, water is furnished by the numerous artesian wells, many of which have a flow of from 2,000 to 4,350 gallons per minute.

**Mining.** The Black Hills constitute one of the most valuable gold districts in the United States, and are said to contain the richest hundred square miles in the world. Producing about one-twelfth of the gold output of the states, South Dakota is outranked only by California, Colorado and Nevada. In 1915 the state's gold product was valued at $7,400,000, and practically all of it was produced by the famous Homestake Mine at Lead City. Silver is another important product, and lead, copper, tin, iron, mica, tungsten, graphite, granite, sandstone, limestone and other valuable minerals are found in the Black Hills. An excellent paving and building stone, known as red quartzite, or Sioux Falls jasper, is quarried along the Big Sioux River. Chalkstone, used in the manufacture of cement, is found near Yankton, and large quantities of brick and fire clays are produced.

**Manufactures.** Manufacturing is closely related to the agricultural pursuits; it is as yet of small importance. The milling of the great wheat crop is the chief industry. The production of butter, cheese and condensed milk is second in importance, followed by printing and publishing and the manufacture of lumber and timber products. South Dakota in 1910 ranked forty-fourth among the states in the value of manufactured products, but in 1915 there was an increase of 35.7 per cent in the value.

**Transportation.** All sections of South Dakota are penetrated by railroads, and short branch lines and spurs are being extended into newly-developed districts. In 1915 there were 4,240 miles of railroad in the state. The chief roads are the Chicago, Milwaukee & Saint Paul; the Chicago & North Western; the Chicago, Burlington & Quincy; the Great Northern, and the Chicago, Rock Island & Pacific. In 1915 there were 56,354 miles of public road, only 290 miles of which were paved. With careful piloting, the Missouri is navigable between Sioux City, Iowa, and Fort Benton, Mont.

## *Government and History*

**Government.** South Dakota is governed by its original constitution, adopted in 1889. A convention for the revision of the constitution may be called if approved by two-thirds of the members of each house of the legislature and a majority of the voters. Amendments must be approved by a majority of the members of each house and by the voters. All male citizens over twenty-one years of age, or those who intend to become citizens, and who have lived in the United States one year, in the state six months, in the county thirty days and in the precinct ten days, are entitled to vote. The proposition to adopt full woman suffrage was defeated in 1914, and again in 1916. The right to the initiative, applying to statutes, though not to amendments, is in force. Not less than five per cent of the electors may propose measures which the legislature shall enact and submit to a vote. There is a referendum law.

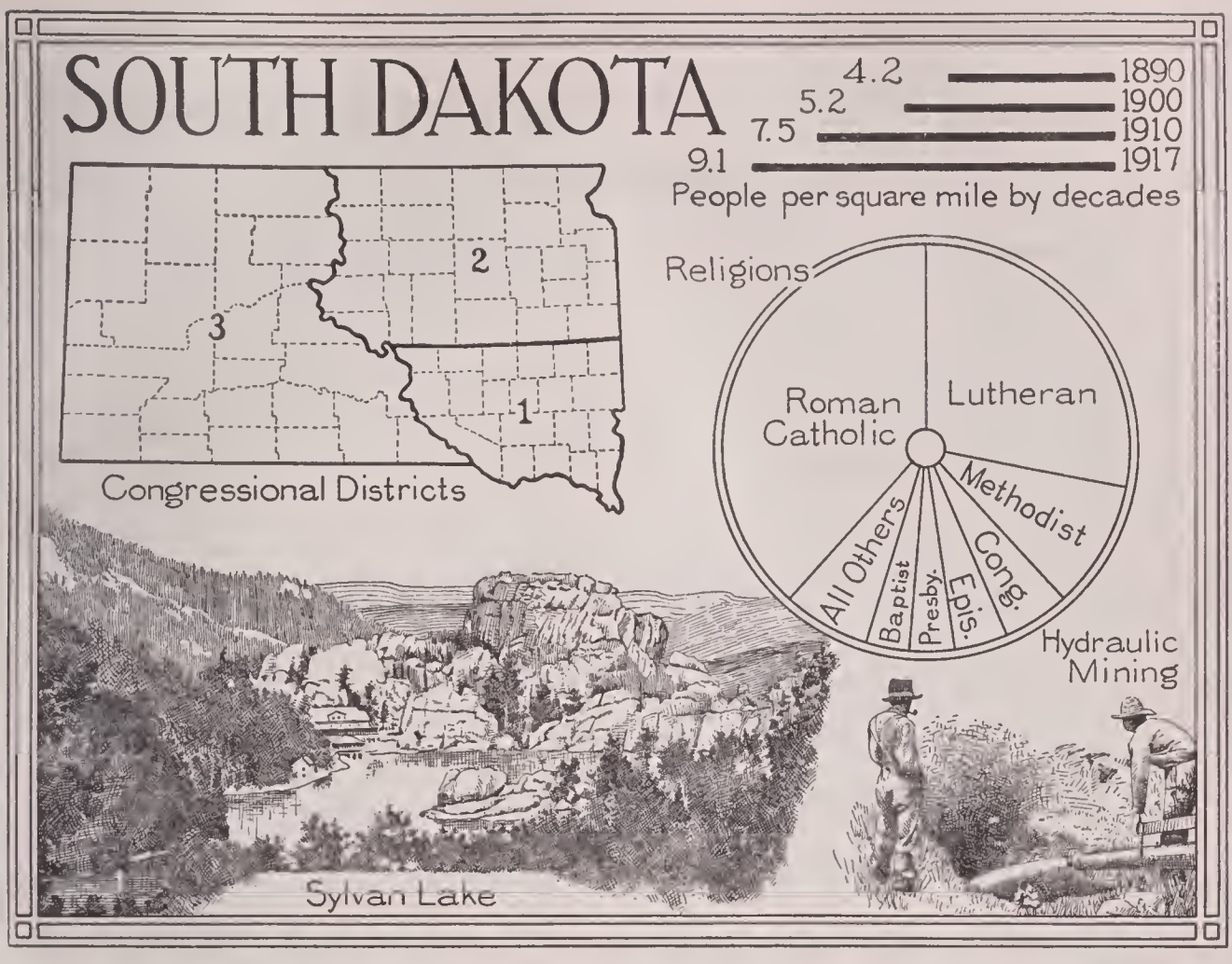
The *legislature* consists of a senate and a house of representatives, elected biennially. The senate is composed of not less than twenty-five nor more than forty-five members, and the house of representatives of not less than seventy-five nor more than 135 members.

The *executive officials* are the governor, lieutenant-governor, secretary of state, auditor, treasurer, attorney-general, superintendent of public instruction and commissioner of school and public lands, all of whom are elected biennially. The treasurer cannot be elected for more than two successive terms. The governor's power of veto does not extend to measures passed by popular vote.

The *judicial department* consists of the supreme court, circuit and county courts, justices of the peace and police magistrates. All judges are elected by the people.

In 1915 capital punishment was abolished, and in 1916 a constitutional amendment prohibiting the liquor traffic was approved by the voters.

**History.** The present state of South Dakota was explored by Lewis and Clark in the Northwest Expedition in 1804-1806. The *Yellowstone,* the first steamboat on the Missouri, ascended the river to Fort Pierre in 1831, where, during the next year, a trading post was established by the American Fur Company. This settlement was later sold to the government and became an important military post of the




Northwest. In 1856 a permanent industrial settlement was made at Sioux Falls, and within a few years many settlements were established along the Missouri River and in the eastern part of the present state.

The Dakotas were a part of the Missouri Territory until 1820, and the eastern section was successively included in the territories of Michigan, Wisconsin, Iowa and Minnesota. From 1854 to 1861 the western part of the present states of North Dakota and South Dakota was included in Nebraska Territory. In 1861 the Territory of Dakota was organized, including North Dakota, South Dakota and parts of Wyoming and Montana (see NORTH DAKOTA). Its development was retarded by the War of Secession and local Indian disturbances. Under the famous chiefs, Spotted Tail, Red Cloud and Sitting Bull, there were many serious uprisings, known as the Sioux Wars.

In 1882 the Dakotas acquired their present limits, and the territory was divided into two sections. The south section was the first to frame a constitution, and in 1885 it applied for admission into the Union. In 1887 the proposition for the division of the territory into two states was approved by the voters. Two years later the constitution of 1885, with slight changes, was adopted, and on November 2, 1889, South Dakota became the fortieth state of the Union.

The Indians were finally defeated by General Nelson A. Miles in the Battle of Wounded Knee in 1890, and since that time their lands and reservations have steadily decreased in size, and the development of the state has been rapid.

**Other Items of Interest.** The *Devil's Tower* is the name given to an isolated, fluted column of rock which rises from the comparatively level land along the North Fork of the Cheyenne to a height of more than six hundred feet.

In the Black Hills region is a group of hot springs whose curative properties attract many visitors. The Indians believed these springs to be the home of the Great Spirit, and had great faith in their curative properties.

Parts of South Dakota feel the influence of the Chinook winds (see CHINOOK), which melt the snows with great rapidity. Less beneficial are the hot winds which in the summer sometimes sweep up from the hot, dry regions far to the south, withering and blighting the crops in their path.

# *RESEARCH QUESTIONS ON SOUTH DAKOTA*

**(An Outline suitable for South Dakota will be found with the article "State.")**

What and where are the Bad Lands? For what are certain portions of this region useful?

Where, so far as is known, is the richest hundred square miles in the world? What makes it so?

Which had a constitution first, North Dakota or South Dakota? How many states entered the Union between the close of the Revolution and the entrance of South Dakota?

What is the Devil's Tower and where is it located?

What are some of the scenic features of the Black Hills region?

Is the loftiest point in South Dakota higher or lower than that in each of the states upon which it borders?

What is the difference in the way water for irrigation is obtained in the eastern and the western sections of the state?

Of how many territories has the South Dakota region formed a part?

What Indian chief was most famous in the history of this region?

What advanced theories have been put into practice in the penal system of the state?

What effect did the absence of trees in the Dakota territory have on the homestead laws?

What was the first steamboat on the Missouri? When did it reach the Dakota region?

How is the permanent school fund secured? How does the state rank, as regards illiteracy, with others in the west north-central group?

How many states surpass South Dakota in the production of its chief crop? Does this number seem to be growing or decreasing?

What is the difference in the method of punishment for murder in South Dakota and in Illinois?

What stand has the state taken on the liquor question?

How does the state compare in its number of Indian inhabitants with North Dakota? With Oklahoma?

Is the population largely rural or urban—that is, do more of the inhabitants live in the country or the city?

What is a blizzard, and how does it differ from an ordinary storm? Where does it originate, and what causes it? See BLIZZARD.

How many constitutions has the state had?

What advanced legislation has been adopted?

How many states are larger than South Dakota? How many of these larger states have a greater population?

Where are the Black Hills located with respect to the Cheyenne River?

What is the railway mileage to each hundred square miles of area? How does the state compare in this respect with the states that bound it?

What is South Dakota's popular name? What right has it to this name?

What does the proper name of the state mean?

How much below the highest point in the state is the lowest point?

What two famous soldiers took part in the engagements against the Indians in the Dakota region?

The town of Deadwood is situated nearly a mile above sea level.

Some of the artesian wells of the state exert a pressure so remarkably strong and regular that they are used for driving machinery and putting out fires.

In the opening up of many territories settlers gained their right to land by making "clearings"—that is, by cutting down the trees over a certain portion of their holdings; in the Dakota region, on the other hand, early homestead laws required the planting of a certain number of trees. E.B.P.

Consult Robinson's *Brief History of South Dakota;* Armstrong's *Early Empire Builders of the Great West.*

**Related Subjects.** The reader who is interested in the study of South Dakota will find much helpful material in the following articles:

CITIES AND TOWNS

Aberdeen
Lead
Mitchell
Pierre
Sioux Falls
Yankton

HISTORY

Custer, George Armstrong
Lewis and Clark Expedition
Miles, Nelson A.
North Dakota, subhead *History*
Sitting Bull

LEADING PRODUCTS

Gold
Silver
Wheat

PHYSICAL FEATURES

Bad Lands
Black Hills
Minnesota River
Missouri River

**SOUTH DAKOTA,** UNIVERSITY OF, a state institution located at Vermilion, founded by act of the first territorial legislature of 1862. The school was first opened to students in 1883. When the state was admitted to the Union in 1889, the university received seventy-two sections of land. Tuition fees are very small, and the annual income is largely from an appropriation by the state legislature and income from the land grants. The university is organized into colleges of arts and sciences, law, medicine, engineering and music. The state conducts its work in geology, natural history, public health and pure food and drugs through the institution. There are about sixty instructors and over 680 students. The library contains more than 31,000 volumes.

**SOUTHERN CROSS,** a famous constellation in the southern hemisphere. Its southernmost star is of the first magnitude, the eastern and northern stars of the second magnitude, and the western star of the third. The four stars are not arranged in the exact form of a cross, therefore to distinguish the constellation is difficult except to one long familiar with it. The upper and lower stars, forming the upright of the cross, are the pointers to the south pole. This constellation is by no means as splendid as many constellations in the northern hemisphere, and is usually considered disappointing by those who see it for the first time.

For explanation of magnitude, see STAR, subhead *Magnitude.*

**SOUTHEY,** *south'i,* ROBERT (1774-1843), an English poet and prose writer, associated with Wordsworth and Coleridge in the Lake School. He was born at Bristol, but lived during most of his boyhood with an aunt at Bath, having at an early age lost both parents. He studied at Westminster School, from which he was expelled for writing a satire on flogging, and later at Oxford, where he remained only two years. In 1794, with Coleridge and Lovell, he planned a socialistic colony, or "pantisocracy," to be founded in America, but the scheme was never carried out. In the following year he married Edith Fricker, a sister of the lady who later became Coleridge's wife, and soon afterward went with his uncle to Portugal.

After his return to England he established himself with his wife at Keswick, in the Lake District. Here he devoted himself to study and to the production of his numerous and varied writings, working always with great diligence. In 1807 the government granted him a pension of £160 a year, which was later increased to £460. The income from his books was also considerable. Early in his life Southey had been a pronounced radical in politics, as in religion, but as he grew older he became more and more conservative; and in 1813, when he was appointed poet laureate, he was a stanch Tory. In 1837 his wife died, after a period of insanity, and two years later he married Caroline Bowles. From the time of his second marriage until his death his mind grew weaker and weaker, until it became an absolute blank.

Southey is to-day ranked higher as a prose writer than as a poet. Indeed, in his own day, Byron, one of the sharpest critics of his poetry, said, "Southey's prose is perfect." Prose was his natural medium of expression, and he himself felt that he was scarcely justified in putting his thoughts into verse, though some of his poems were very popular. Among his poems are *Joan of Arc; Thalaba, the Destroyer; Madoc; The Curse of Kehama* and *Roderick, the Last of the Goths,* all narratives based on legends and myths, and a *Vision of Judgment,* written in honor of George III. Some of his

prose writings are a *History of Brazil,* a drama *Wat Tyler,* the *Letters from England by Don Manuel Alvarez Espriella, The Doctor,* and biographies of Nelson, Wesley and Bunyan. In *The Doctor* appeared an old folk tale—the story of *The Three Bears.* A.MC C.

Consult Dowden's *Southey,* in English Men of Letters Series.

**SOUTH O'MAHA,** a former city in Douglas County, Nebraska, since 1915 a part of the city of Omaha (which see). Previous to its incorporation it had a population of 27,000. In the South Omaha district are several large meat-packing establishments. The place was first settled in 1882.

**SOUTH PO'LAR EXPLORA'TION.** See POLAR EXPLORATION.

**SOUTH SEA COMPANY,** an English trading company founded in 1711. For the exclusive right to trade in the South Seas, the wealth of which was considered boundless, and on the agreement of the government to pay £600,000 a year (about $3,000,000), the company took over £10,000,000 ($50,000,000) of the national debt. The corporation received the right to supply the Spanish-American colonies with slaves, and in the spring of 1720 assumed the entire national debt of £30,000,000 ($150,000,000). The stock soared to 1,000, and then suddenly the directors began selling it. Law's Mississippi Scheme (which see) collapsed in France simultaneously, and the English stockholders were plunged into a panic. Every one sold, the company became bankrupt, and England's financial stability was threatened. At the suggestion of Sir Robert Walpole the company was investigated and found fraudulent; the property of the directors was seized, and about one-third of the original investment was restored to the stockholders.

**SOVEREIGN,** *sov'er in,* or *suv'er in,* a current English gold coin, of the value of £1 and weighing 123.274 grains troy. The sovereign is the standard monetary unit of Great Britain, its fineness being fixed at 916.66, or twenty-two carats. It was first issued by Henry VII in 1489; on its surface was stamped the figure of the king, crowned and in his royal mantle, seated on the throne, holding the scepter and orb. At that time the coin weighed 240 grains. It was used in this form until the reign of James I, when the name *Unite* was given to the coin, to commemorate the union of England and Scotland. Until 1816 the gold coinage of the kingdom was a secondary part of the monetary system, but in that year the silver standard was discontinued and the gold standard was adopted (see BIMETALLISM).

George III chose the sovereign for the new unit of currency, and it was first issued in its present form in 1817. At the same time began the issue of the half sovereign, of proportionate weight. The weight of 934½ sovereigns is equal to the weight of twenty troy pounds, and this is used as a basis for the weight of the sovereign. It is eleven-twelfths pure gold and one-twelfth copper.

The sovereign is equal to twenty English shillings, and to about $4.86 in the coin of the United States and Canada.

**SOVEREIGNTY,** *sov'er in ti,* the political condition of a state by which it has power to impose its will continuously and without exception upon all persons and matters within its jurisdiction. In other words, such a country knows no higher power than its own mandates.

The modern use of "sovereign" as applied to a state signifies that that particular state possesses the right not only to form its own laws and conduct its own internal and external affairs, but also has the right to declare war without reference to or consent of any other state. The separate states of the American Union cannot properly be regarded as sovereign states, for while possessing many of the attributes of sovereignty, they cannot be regarded as absolutely independent concerning external affairs affecting the whole of the United States. On all matters internal, affecting only itself, each state is sovereign. No separate state of the Union can force its will upon any other state. The sovereign power lies in the federation of states.

The modern conception of sovereignty differs considerably from that of the French king Louis XIV, who said, "I am the State." The democratic tendencies in all countries are leading people clearly to see that the sovereign power lies in the hands of the people, and its expression must be the will of the people. An approach to the government of the people "for the people and by the people" is being more and more manifested.

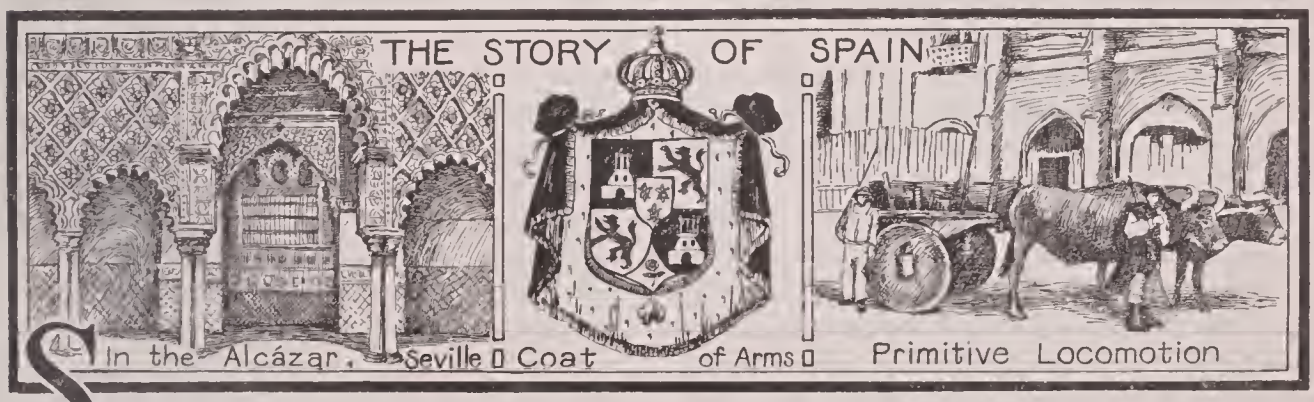
Consult Merriam's *History of the Theory of Sovereignty Since Rousseau.*

**SOWING MACHINE, SEEDER,** or **DRILL,** a machine for planting grain. Formerly all grain was sown by hand, and in regions where farms are small this practice is still continued. Among the earliest forms of sowing machine was one consisting of a cylindrical vessel with small holes at regular intervals. The cylinder

was mounted on a vertical axis and made to revolve rapidly by hand or other power. The seed was thrown out through the holes and scattered evenly over the ground. The first of these machines were useful only for round seeds, like turnip seed. Later modifications of it were successful in sowing grain. The machine was attached to a wagon which operated the seeder as it moved over the ground.

The modern seeder or drill now in use consists of a narrow chest or box eight or ten feet long, with circular openings in the bottom from three to four inches apart. This box is mounted on two wheels, one at each end. Iron tubes extending to the ground connect with the openings in the bottom of the box. At the lower end of these tubes is attached a device for making a small furrow or drill. Back of each tube is a small wheel or other device for covering the grain. The box contains a revolving brush for the purpose of distributing the seed evenly. There is also an adjusting device to adapt the seeder to grains of different sizes. These drills are drawn by a team of horses and, under ordinary conditions, one of them will plant from eight to ten acres a day on fairly-level ground.

**SOW THISTLE,** *sou this'l,* a group of weeds belonging to the Composite family. Though native to Europe, several species have been introduced into the United States, where they have become a nuisance in pastures and grain fields. The common sow thistle grows to be two or three feet tall and has a branching stem, milky juice and small, yellow blossoms. In the north of Europe the peasants use the tops and leaves of the plant as a potherb. The sow thistle can be eradicated only by careful cultivation and the planting of crops which will check its growth.




**SPAIN,** *spayn,* a kingdom of Southwestern Europe, a picturesque country of romantic traditions, with a civilization that is a curious blending of ancient customs, medieval grandeur and modern ideas. It was under the flag of Spain that Columbus discovered America, and Spanish navigators played an all-important part in the exploration and settlement of the New World. In the sixteenth century this kingdom was the most powerful nation in the world. Yet, of its numerous colonial possessions, which practically encircled the globe, none remain but small districts on the north and west coasts of Africa and a few small islands in the Gulf of Guinea.

**Size and Location.** Having an area of 190,050 square miles, continental Spain is about twice the size of the state of Oregon, or almost nine times the size of Nova Scotia. Including the Canary and Balearic islands, the area is 194,783 square miles. Spain occupies the greater part of the Iberian Peninsula. Its northwestern provinces border on the Atlantic, but the country is cut off from the ocean on the greater part of its western boundary by Portugal and on the extreme south by the English fortress of Gibraltar, which is situated at the end of a long isthmus known as Neutral Ground. Spain's east coast forms the western boundary of the Mediterranean Sea.

**The People and Their Customs.** Spain is a country of sunlit courtyards surrounded by picturesque balconies. Nearly every dwelling, from the meanest cottage to the most magnificent palace, has barred or latticed windows. Not less picturesque than their cities are the buoyant, gayly-dressed people themselves. They are of medium height and of dark complexion, the women being especially noted for their beauty, dignity and grace. Even in the decline of his country the Spaniard did not lose his proud bearing; "he seldom looks at the ground as if he contemned it," but his great fault is that "he cares not how little he labors." It seems most inconsistent that these light-hearted people, loving the light fandango and

music of the castanet and guitar, should find their chief amusement in the cruel bullfight, attractive to others only for the pomp and pageantry with which it is attended, and forbidden in most countries.

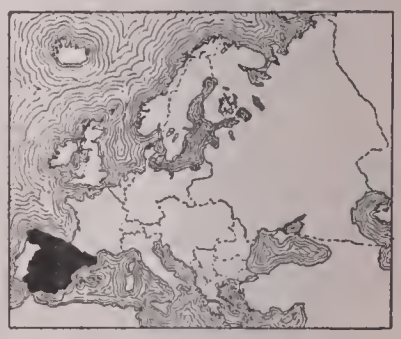
The Spanish are descended from the early Iberian inhabitants of the peninsula and the Roman and Teutonic invaders. The Basques of the north, numbering about 60,000, are more purely Iberian than the other inhabitants, and differ in language and customs. There are many tribes of gypsies scattered throughout the country. The total population of Spain, numbering 20,355,983 (estimate for 1913), is smaller than that of any other country having as old a civilization and equal natural resources. The most barren province of Ireland is not more scantily populated. The present population is less than one-third of that of the kingdom when in the height of its power. This decrease in population is due to the expulsion of the Moors, to the wars of the sixteenth and seventeenth centuries and to emigration.

Unlike Italy, Spain has a large rural population and comparatively few important towns. The largest cities are the capital, Madrid, and Barcelona, both having over 580,000 inhabitants, and Valencia, Seville, Malaga, Murcia, Saragossa and Cartagena, each having a population of over 100,000. See list of *Related Subjects* at the close of this article.

**Education.** Since intellectual advance usually accompanies material progress, Spain's educational development has been slow, and two-thirds of the people are illiterate. Although compulsory education with an elaborate system of primary schools, was authorized in 1857, the law was not enforced until 1909. Public schools are maintained by local taxation and are under governmental inspection. There is at least one high school in every province. These give preparation for the ten universities of Spain, which are located at Barcelona, Granada, Madrid, Oviedo, Saragossa, Salamanca, Santiago, Seville, Valencia and Valladolid. The government also supports special schools, such as those of engineering, agriculture, music and fine arts.

**Religion, Language and Literature.** Spain still holds its reputation as "the most Catholic country in the world." It is a land famed for its houses of worship; the cathedral at Seville is one of the most magnificent of Christian churches. The Roman Catholic churches and clergy are supported by the state. There are numerous influential Orders, but since 1910 the establishment of additional religious houses without the consent of the government has been prohibited. There are about 30,000 Protestants, 7,000 Jews and 4,000 Rationalists in the country.

The sonorous Spanish language is derived from the Latin. The Castilian dialect is the chief language of the country. The Galician and Catalan, which more closely resemble the French, are spoken in the northern and eastern provinces; the Andalusian dialect of the south is also the language of South America and Mexico.



LOCATION MAP
The southern point of Spain extends farther south than the most northerly point on the African coast.

The romantic songs and tales of the twelfth century marked the beginning of the national literature of Spain. No other country is so rich in these heroic ballads, most of which celebrate the deeds of Charlemagne and the Cid (see CID, THE). Juan Ruiz is among the most distinguished of the early romance writers, and Juan Manuel is noted as a prose writer of this early period. The greatest writers of the Golden Age of Spanish literature (1550-1650) were Calderon de la Barca and Lope de Vega Carpio, the great poets and dramatists, and the famous Cervantes, author of *Don Quixote*, one of the world's masterpieces of fiction (see VEGA CARPIO, FÉLIX LOPE DE; CERVANTES SAAVEDRA, MIGUEL DE). During this period Spain invented the picaresque novel, that is, one having for its hero a "picaro," or rogue. This type of story was widely imitated in other countries.

The seventeenth century was a period of dramatic production, but in the next hundred years the national literature declined. The Spanish writers were largely imitators of the French, and the great wave of democracy and spirit of freedom which swept over Europe in the nineteenth century reached Spain through France. During the latter part of the nineteenth century and early in the twentieth the novel was the most prominent literary form in Spain.

**Art.** See PAINTING, subhead *Seventeenth Century*. Spain produced Velasquez, a painter who ranks with the greatest masters of the art, and another, Murillo, who ranks also among the very great.

## *The Country and Its Industries*

**The Land.** Spain is a country of contrasts, not only between the old and new civilizations, but in its natural features as well. It is a country of boundless plains and rugged sierras, barren mountains and fertile valleys, trackless and silent wastes and flourishing gardens of the vine, olive and orange. In the northwest provinces, bordering the Atlantic and the Bay of Biscay, there are fertile meadows and fields of flowers, such as those of England, and dense forests of oak, beech and chestnut. In the south there are rich sections of luxuriant tropical vegetation, but barren steppes, studded with a few fertile oases, border the southeastern coast.

Three-fourths of the peninsula is a treeless table-land 1,000 to 3,000 feet above the sea, enclosed by high mountains and broken by rough sierras. This plateau is divided into two parts by the Sierra de Guadarrama and Sierra de Gredos. The wooded Cantabrian Mountains form a barrier on the north, and the Sierra Morena range bounds the plateau on the south. The mountains in Murcia and Aragon shut off the Mediterranean on the east.

On the north, Spain is separated from France by the Pyrenees, the highest summit of which is the Pico de Aneto (11,160 feet). Near the southern coast rise the lofty Sierra Nevada Mountains, whose culminating peak, Mulhacén (11,664 feet), is the highest in Spain and one of the loftiest in Europe.

The Atlantic coast is steep and rocky, and in its many fiordlike indentations are good harbors. The south and east coasts, however, are comparatively regular, the gentle curves projecting in a few prominent headlands. From the Portuguese boundary to the Strait of Gibraltar, the flat coast is broken by sand dunes and wide marshes. The port of Cadiz is the only important harbor on the southern coast. At Gibraltar the coast rises to the precipitous rocky cliffs which extend almost to Cape de Palos. Here the cliffs drop to flat beaches, lifting again to the mountainous headlands at Cape Nao. These alternating stretches of low beaches and rocky cliffs follow the entire eastern coast.

**Rivers and Lakes.** Four of the great rivers of Spain rise in the central table-land and empty into the Atlantic. The Tagus and the Douro flow west through Portugal; the Guadiana follows a southerly course along the Portuguese boundary; the Guadalquivir flows south through the olive-clad region of Andalusia. The Ebro rises in the Cantabrian Mountains and flows east to the Mediterranean. It is the only navigable stream on the Mediterranean side. The Guadalquivir is the deepest stream of Spain, and is navigable for large vessels to Seville.

There are numerous small mountain lakes, and in the barren steppes are many salt ponds, but the only bodies of water of any size are three coast lagoons, the Albufera near Valencia, the Mar Menor of Murcia, and the Laguna de la Janda in Cadiz.

**Climate.** Every climate of the temperate zone is to be found in Spain. As great extremes of temperature as occur in any part of Europe are experienced in the central table-land. In this region the summers are very warm and almost rainless, especially in the Ebro valley, where the treeless sands, like a concave mirror, reflect and intensify the heat of the sun. However, nights are very cool, and sudden changes of temperature are frequent in all seasons. The winters are extremely cold, and there is skating in Madrid during two months of the year.

In Andalusia, or South Spain, there is a subtropical climate. During the mild winter vegetation is most luxuriant; the summers are very warm. The dry steppes and plains of the southeast coast are the warmest sections of the country and are frequently swept by the "solano," a withering and scorching wind which sometimes blows for two successive weeks. The northwest provinces on the Atlantic seaboard have a climate as equable and moist as that on the western coasts of England and Scotland, and roses bloom in the gardens at Christmas time.

**Agriculture.** A large proportion of the inhabitants are engaged in farming, but methods of cultivation are generally crude. Although eighty-eight per cent of the land of Spain is productive, about one-half of the country remains uncultivated. In an attempt to encourage this industry, agricultural commissioners have been appointed in every province, and many agricultural institutions, including the royal school at Aranjuez, have been established. The large estates, formerly rented to tenants at high rates, are being divided and sold to the farmers with small capital.

Irrigation is necessary in the central and eastern districts and in parts of the northwestern

provinces. The two most productive regions are in Valencia and Catalonia, where the land is carefully terraced, fertilized and irrigated by a network of canals fed from reservoirs. Here all of the available land is tilled, and large crops of oranges, lemons, grapes and other fruits are produced. Rice is grown extensively in the swamps in Valencia. In the northwest provinces the land is naturally more fertile and the rain more plentiful. In this section European fruits are cultivated, and the cultivation of cereals, diversified farming and stock raising are important. In the valleys of Andalusia, olives, almonds, figs, pineapples, bananas, the date palm and some sugar cane are grown.

The most important crops of the country are wheat, barley, rye, oats, grapes and olives. Vines are grown in every province, and large quantities of wines, especially the famous Malaga and Alicante, and the sherry and tint wines from Jerez de la Frontera, as well as grapes and raisins, are exported. The olive groves embrace hundreds of square miles, and from the cities of Seville and Cordova, Spanish olives and olive oil are sent to all parts of the world. The silkworm is extensively cultivated, especially in the south. Spain is noted for its fine horses and mules and its merino sheep. Large flocks of goats, whose flesh and milk are favorite foods, are raised throughout the country.

**Forests.** The table-land and mountains of Central Spain are scantily supplied with trees, and in many sections the lack of timber is severely felt. The finest forests are in the West Pyrenees and Cantabrian Mountains, and the most valuable trees are the cork oak and Spanish chestnut. Cork forests are also abundant in the southern mountains. Spain's output of cork exceeds that of any other country in the world, and together with Portugal Spain produces almost three-fourths of the world's supply. The amount annually exported exceeds 78,000 tons, and comes chiefly from the districts of Seville and Barcelona.

**Fisheries.** Sardines are the most important product of the fisheries, and tunny fish and cod are also caught in large quantities. The value of the annual export of canned and preserved fish exceeds $5,600,000.

**Minerals.** The vast mineral resources of Spain are still in an early stage of development; still, no other country of Europe produces as much copper, lead and mercury and so many minerals in large amounts. Spain also ranks first in Europe in the production of salt, and it has been said that "there is enough saltpeter in Central Spain to blow up the world." Spain rivals Austria in the production of silver, most of the output coming from the province of Jaén. Lead ore is obtained here and in Murcia; copper in Huelva; iron in Biscay and Murcia; and coal mines are scattered throughout the country. The famous mercury mines of Almaden were the richest in the world until the discovery of mercury in California. These and the salt works are the only mining industries owned by the government; others are controlled by foreign companies, chiefly British. Serious strikes have recently reduced the output of the mines, but the value of the annual mineral products is about $39,000,000.

**Manufactures.** The northwestern provinces, being nearer to the commercial centers of Europe, have the largest manufacturing industries. The chief manufactures, cotton goods, woolens and laces, are centered in Barcelona. Linen and paper mills are also numerous in the northern provinces. The weaving of silk is growing in importance in the south. Seville produces the greatest amount of cork products, but those of superior quality are manufactured at Barcelona. Toledo is still noted for the production of fine blades and La Trubia and Oviedo for arms. There are manufactories of gloves, shoes, ropes, mercury and charcoal. Although the protected market and the recent use of electricity and the water power of the mountain streams have increased manufactures, Spain's production falls far short of its needs and possibilities.

**Transportation and Commerce.** Spain is reached by Western tourists by way of the grim fortress of Gibraltar or through the passes of the Pyrenees from France. There are over 9,800 miles of railroad within Spain, all owned by private companies of foreigners. The gauge differs from that of the French line, making it necessary to change trains when the frontier is reached. In 1914 the construction of a standard gauge railroad from Madrid to the French border was planned. In the larger cities electric cars and motors make their way among the mule carts and ox teams, which are still the most common "carryall" in Spain. The roads are generally poor, and transportation in the interior is inadequate to the needs of the people.

Although Spain has twenty-one seaboard provinces bordering the Atlantic and the Mediterranean, the country is not important among the commercial nations of Europe. However, in recent years the merchant marine has been increased, and foreign trade is being revived.

# SPAIN

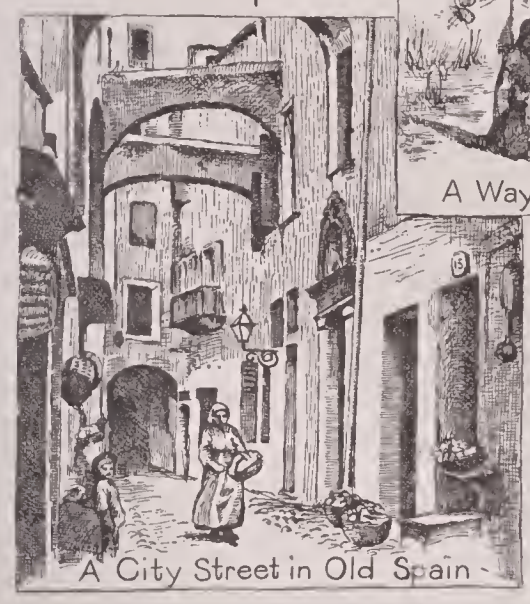
England's Rock of Gibraltar

The Escorial

The Peasant's Transportation

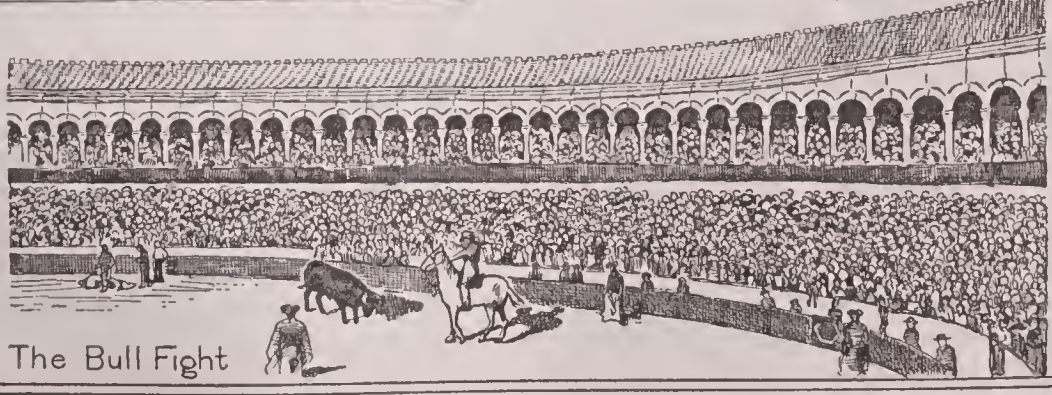
Peasant Costumes

A Wayside Shrine



A City Street in Old Spain

A Farmhouse in Southern Spain

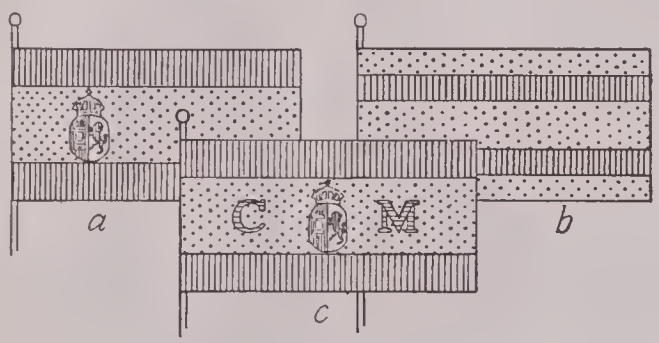


The Bull Fight

Much of the trade in normal times is with Great Britain, France, the United States, Germany, Argentina and Cuba. Trade is protected by high duties, and since 1894 the United Kingdom has been the "most favored nation." In 1912 a commercial treaty with Portugal was broken, and the regular tariff rates now apply to Portuguese goods. The principal exports are wine, over 3,000,000 gallons of which go yearly to Great Britain alone, cork, metals, olives and other fruits, wool and cotton goods. Foodstuffs, live stock, machinery, coal, raw cotton and linen are imported. Bilbao and Barcelona are the chief ports.

## *Government and History of Spain*

**Army and Navy.** Military service for a term of eighteen years is compulsory in Spain. There is an Aeronautical Service, consisting of balloon and aeronautic sections, attached to the military department. The reserve troops




THE FLAGS OF SPAIN
(*a*) Warship; (*b*) merchant marine; (*c*) mail.

number about 90,000 and the total strength of the field army is about 300,000 men. There are three military commissions in the colonies. The Civil Guards, numbering 20,000, and the Carabinos, or military police, preserve order throughout Spain and act as the customs guard on the frontier.

The navy has been comparatively weak, but a recent bill provides for the expenditure of about $55,000,000 for the six years following February, 1915; the program includes cruisers, destroyers, gunboats, many submarines and mines, new repair docks and works. In 1915 the navy consisted of not more than forty ships and about 15,200 sailors and marines.

**Colonies.** Of its once extensive colonial possessions, Spain now retains only Adrar and Rio de Oro, on the Sahara coast, Spanish Guinea, also on the west coast of Africa, and the islands of Fernando Po, Annobon and Corisco and the Elobey Islands, all in the Gulf of Guinea. The total area of these possessions is 85,814 square miles, and their population numbers 235,844. The Canary and Balearic islands are considered a part of Spain, and are under the central government. The colonial government of Spanish Guinea and of the islands in the Gulf of Guinea is centered at Fernando Po. Rio de Oro and Adrar are under the government of the Canary Islands.

**Government.** Spain is a constitutional monarchy. Its present constitution was adopted in 1876. The executive power is vested in the king and a council of ministers appointed by him. The monarch is inviolable, but the ministers are responsible to the Cortes and must sign all of the king's decrees. The king has power to assemble, suspend or dissolve the Cortes.

The legislative authority is vested in the king and the Cortes. The Cortes meets annually and consists of the Senate and Congress of Deputies. There are 360 Senators, eighty of whom are hereditary, 100 appointed and 180 elected. The hereditary Senators are the adult sons of the king and those of the heir, the grandees, captains-general in the army, admirals, archbishops, and the presidents of the councils of state, of the supreme tribunal, of the tribunal of accounts and of the war and navy. Half of the elective Senators retire every five years, and all retire whenever that body is dissolved by the king. The Deputies are apportioned according to population, one to every 50,000 people. Senators and Deputies have equal authority. If the Cortes is dissolved by the king, a new Cortes must assemble within three months. Since 1907 voting has been compulsory for all males over twenty-five years of age, and all such voters must be registered, possess full civil rights and must have been members of the municipality for two years.

*Local Government.* Each province and commune has its own elected assembly, and neither the king nor the Cortes has the right to interfere in the government of the established communes and provinces except in the protection of general or permanent interest.

**The Three Conquests of Spain.** This ancient country, known to the Greeks and Romans as *Hispania* or *Iberia,* and inhabited by people they called *Celtiberians,* was colonized in the twelfth century before Christ by the Phoenicians. In the third century before Christ the Greeks founded the city of Saguntum, and the Carthaginians crossed the Mediterranean to the peninsula and founded New Carthage.

The first real conquest of the peninsula was made by the Romans, when in the Second Punic War they defeated the Carthaginians and made Spain a Roman province. It became one of the most flourishing provinces of the empire and a center of Roman culture, producing many of Rome's greatest writers, including Seneca, Martial and Quintilian. During the reign of Constantine the Great, Christianity became the dominant religion.

With the fall of the Roman Empire, Spain fell under the power of the three Gothic tribes; the Vandals conquered the south, naming it Vandalusia (now Andalusia), and the Suevi and Alans settled in Galicia and Portugal. By 585 the Visigoths had subjected these invaders and had conquered the whole peninsula.

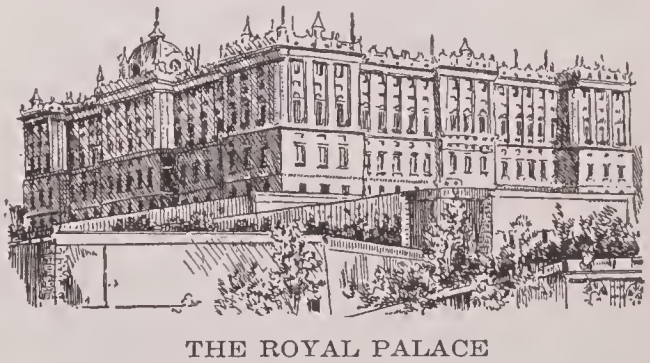
After a mastery of nearly two hundred years, they in turn were subjugated by the Moors in 712. The language and customs of the Arabs were introduced. Gorgeous palaces and fortresses, such as the Alhambra at Granada, and the magnificent Moorish cities of Cordova, Toledo and Valencia were built. The country prospered and industries advanced.

The Visigoths, driven into the north, had established the small, independent kingdoms of Leon, Navarre and Castile. Charlemagne, in the ninth century, conquered Navarre and extended his empire to the Ebro. The kingdoms of Galicia, Aragon, Murcia and Portugal had been established as the result of the division of the small kingdoms among the sons of the kings. In the thirteenth century all of these Christian principalities united against the Moors, and the Moorish princes were subjugated by Castile, one of the most powerful of the small kingdoms. The other predominant principality was Aragon, which was the first Christian state in which the people were given representation in the government.

**The Union of the Independent Kingdoms.** Aragon and Castile continued to develop, and in 1469, when Ferdinand V of Aragon married Isabella of Castile, these two kingdoms were united, and the fusing of the many independent states into one political unity was begun. The history of the next hundred years, during the reigns of Ferdinand and Isabella, Charles V and Philip II, is one of continued successes and added glories. Ferdinand, called "The Catholic," extended Christianity throughout the peninsula; the Moors lost their last stronghold at Granada; the discovery of America, under the patronage of Isabella, extended the kingdom abroad; Mexico, Central America, Peru, Venezuela, Chile, Cuba, Jamaica and Santo Domingo were acquired; conquests extended to Africa and to Malacca and the Spice Islands in Asia, and with the acquisition of the Philippines, the Spanish Empire girdled the globe. The European conquests included Navarre, Roussillon, Portugal, the Netherlands, Naples, Sicily, Sardinia, the Canaries and the Balearic Islands. Spain had become "the mistress of the world and queen of the ocean."

**The Decline of Power.** Spain's glory did not last long. In 1588 the naval supremacy of the kingdom was lost to England, when the famous Armada was shattered. In the seventeenth century, under Philip III, Philip IV and Charles II, insurrection, religious persecution and civil war weakened the kingdom. The Netherlands were lost (see NETHERLANDS, THE, subtitle *History*). At the close of the War of the Spanish Succession Spain had to give up Naples, Parma, Sardinia and Milan to Austria, Sicily to Savoy, and Gibraltar and Minorca to England.

**Relations with England and France.** A short period of prosperity followed, but at the close of the eighteenth century Spain unfortunately entered the war against the French republic,



THE ROYAL PALACE
As it appears to-day.

losing Santo Domingo to France. An alliance was then made with France against England, but the British victory at Trafalgar, October, 1805, permanently destroyed the Spanish naval power. Napoleon later conferred the Spanish throne upon his brother Joseph, and war with France followed. Napoleon victoriously entered Madrid, December 4, 1808. Not until 1813 were the French forces defeated and driven out of Spain by Wellington's army.

The Spanish king was restored, but the loss of the South American colonies and Mexico and oppression at home resulted in a revolution. Another revolt began in 1868, when Ferdinand's successor, Isabella II, was driven from Spain and a provisional government was established. In 1873 a republic was organized, but two years later Alfonso XII, the son of Isabella,

# *OUTLINE AND QUESTIONS ON SPAIN*

## *Outline*

**I. Position**

(1) Latitude, 36° to 44° north
(2) Longitude, 9° 15′ west to 3° 20′ east
(3) Boundaries

**II. Size**

(1) Actual
(2) Comparative
(3) Dependencies

**III. Physical Features**

(1) The great table-land
(2) Mountain ranges
  (a) Highest peaks
(3) Coastal characteristics
(4) Rivers
(5) Lakes
(6) Influence of physical features on climate

**IV. Industries and Transportation**

(1) Agriculture
  (a) Government encouragement
  (b) Irrigation
  (c) Chief crops
(2) Forestry
  (a) The cork industry
(3) Fisheries
(4) Mining
  (a) Vast resources
(5) Manufacturing
(6) Railroads and cart roads
(7) Trade conditions

**V. The People**

(1) Population
  (a) Predominance of country dwellers
(2) Racial elements
(3) National characteristics
(4) Religion and education
(5) Language and literature

**VI. Government**

(1) Constitutional monarchy
  (a) Executive
  (b) Legislative body
(2) Colonial government
(3) Army and navy

**VII. History**

(1) The early conquerors
(2) The Visigoths and the Moors
(3) Development of an independent, unified kingdom
(4) Decline of power and loss of colonies
(5) Napoleonic era
(6) Later nineteenth century
(7) Spanish-American War

## *Questions*

In what sense may Spain be called "a country of contrasts?"

What did the Greeks call this country? What part did Rome play in its early history?

Who is the best known of Spanish writers, and for what is he famous?

Describe the processes by which the chief product of Spain's forests is secured and prepared for market.

In what sense has Spain a "responsible" government?

How does the area of the colonial possessions compare with that of Spain itself?

When and for how long was Spain a republic?

Give three causes for the decrease in population in Spain.

In what part of the country would you rather spend the winter? Why would you not care to spend the summer in the same place?

When, how and to whom did Spain lose its position as "queen of the ocean?"

What is the chief sport of the country? Why is it frowned upon by other nations? Describe it.

What part of Spain belongs to Great Britain? How long has it done so?

How did a king and queen of this country influence the history of America?

What is the Neutral Ground in Spain? What does it connect?

was made the king of a new constitutional monarchy.

**Recent History.** In 1886 Alfonso XIII succeeded to the throne, with Maria Christina, his mother, as regent. The cruel means employed to quell the rebellion in Cuba brought about the intervention of the United States and resulted in 1898 in the Spanish-American War, and Cuba, Porto Rico and the Philippine Islands passed under the control of the United States. In the years that followed Alfonso XIII did much to build up his exhausted country, but a grave political and economic crisis was caused by the increase in food prices resulting from the War of the Nations, which began in 1914. The country was also disturbed by strikes, chiefly among the miners and railroad employees. As a result of a general strike in July, 1916, all of Spain was placed under martial law, and there was even a more serious crisis in the summer of 1917. The country endeavored to maintain strict neutrality in the war. E.B.P.

Consult Bell's *The Magic of Spain;* How's *Sun and Shadow in Spain;* Hume's *Modern Spain.*

**Related Subjects.** The reader who is interested in Spain will find much information in the following articles in these volumes:

CITIES

| | |
|---|---|
| Almeria | Madrid |
| Barcelona | Malaga |
| Bilbao | Murcia |
| Cadiz | Saragossa |
| Cartagena | Seville |
| Cordova | Valencia |
| Granada | Valladolid |

HISTORY

| | |
|---|---|
| Alfonso XIII | Iberia |
| Alhambra | Isabella of Castile |
| Alva, Duke of | María Christina |
| Armada | Moors |
| Castile and Aragon | Navarre |
| Charles V (Holy Roman Emperor) | Philip II and V |
| Ferdinand V | Sagasta, Praxedes Matco |
| Gonsalvo de Cordova | Spanish-American War |
| Granada | Succession Wars |
| Hamilcar Barca | Torquemada, Thomas de |
| Hannibal | |

LEADING PRODUCTS

| | |
|---|---|
| Copper | Lead |
| Cork | Mercury |
| Fig | Sheep |
| Grape | Wine |

MOUNTAINS

| | |
|---|---|
| Pyrenees | Sierra Nevada |

**SPALDING,** *spawl'ding,* JOHN LANCASTER (1840- ), an American archbishop of the Roman Catholic Church, was born at Lebanon, Ky., and educated at Mount Saint Mary's College, Emmitsburg, Md., and at the University of Louvain, Belgium. He was ordained a priest in Louvain in 1863, and after studying for a year in Rome returned to the United States, where he was made secretary to the bishop of Louisville. In that city he built Saint Augustine's Church for Catholic negroes. From 1872 to 1877 he was in New York, where his unusual ability as a preacher won him considerable distinction; and in the latter year he was consecrated bishop of Peoria, Ill. Poor health compelled him to resign in 1908, and in the next year he was created archbishop.

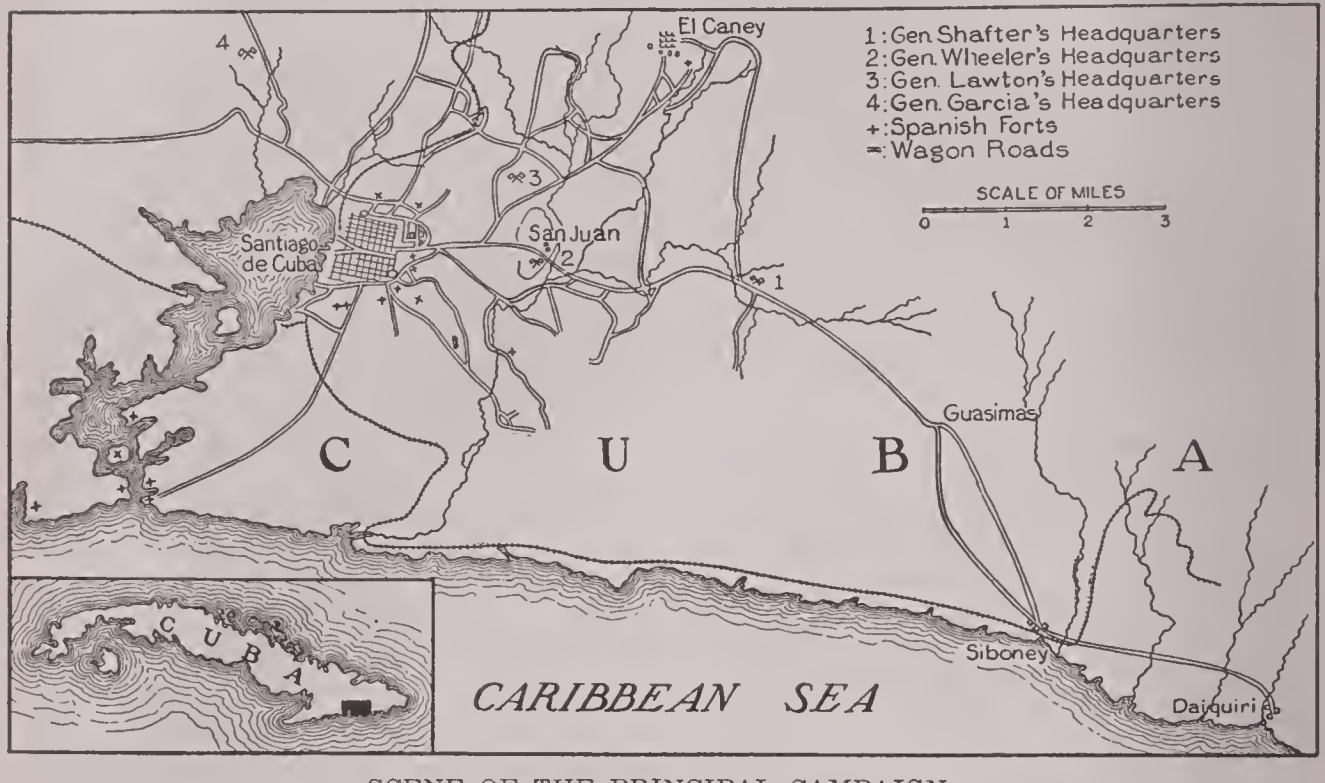
He was prominent in educational matters, being one of the chief promoters of the Catholic University at Washington, and his intelligent interest in social and economic questions led to his appointment in 1902 as one of the arbitrators of the anthracite coal strike question. Because of two attacks of paralysis from which he did not recover fully, he laid down his duties in 1908. His published works include *Religious Mission of the Irish People, Education and the Higher Life, America and Other Poems, Socialism and Labor* and *Religion and Art and Other Essays.*

**SPANIEL,** *span'yel,* a group of dogs of high intelligence, consisting of field and water hunting dogs and several smaller breeds of the fancy or "toy" variety. Among the field hunters are the *Clumber, Sussex, Norfolk* and *Cocker;* the best known water spaniels are the Irish breeds. The lap spaniels include the *King Charles,* the *Blenheim* and the *Japanese.* All varieties have long bodies, drooping ears and a thick, silky coat. They show a variety of colors, including liver and white, red and white, and black and white. The spaniels are much prized because of their intelligence, beauty and gentle disposition.

**SPAN'ISH-AMER'ICAN WAR,** a brief war in 1898 between Spain and the United States, but important in its effects upon the world. The contest grew out of the severity and injustice of Spanish colonial administration in Cuba. The policy of successive captains-general, intrusted with the government of the island, had for half a century alternated between ineffectual efforts at conciliation and the utmost severity. Taxes were heavy, and the island became involved in serious financial difficulties. The demand for radical reforms and a measure of self-government became more and more insistent. Revolt succeeded revolt; despotism on the one hand was matched by an-

archy on the other, culminating in 1895 in an insurrection of formidable proportions.

Extreme measures were adopted by General Weyler, the Spanish governor, against Maximo Gomez and other Cuban chiefs, who were penned in narrow parts of the island by lines of intrenchments, barbed-wire entanglements and forts, called *trochas*. Women and children and non-combatants generally were treated with great cruelty, being herded into camps and surrounded by armed guards. They were insufficiently supplied with food and were kept alive largely by assistance from the wretched people among whom they lived and by supplies sent from the United States. Reports of atrocities committed by Spanish soldiers had been frequent and had inflamed the feelings of people in the United States, already exasperated by years of misrule and anarchy almost at their doors.




SCENE OF THE PRINCIPAL CAMPAIGN

The small corner insert shows, in its black area, the part of Cuba pictured in the large map.

President McKinley had steadily opposed recognition of the rebellion; at the same time he had affirmed the possibility of intervention, and the American attitude was naturally resented by Spain. On the night of February 15, 1898, the American battleship *Maine* was blown up in Havana harbor. Responsibility for the disaster will doubtless never be fixed, but American public sentiment accused Spanish agents, and war became inevitable. Congress formally demanded the withdrawal of Spain from Cuba, but before the message could be delivered the American ambassador at Madrid was dismissed. and the Spanish government declared war.

On April 22 Commodore Sampson, with the North Atlantic naval squadron, began a blockade of Havana and the north coast; while Commodore Dewey was ordered from his station at Hong-Kong to the Philippines, a Spanish possession. Dewey's Asiatic squadron fought the first important engagement of the war at Manila Bay, destroyed the Spanish fleet, seized Cavite and awaited the arrival of land forces to reduce Manila.

Meanwhile a Spanish squadron under Admiral Cervera had reached Santiago from the Cape Verde Islands and anchored under the protection of the forts in Santiago harbor. The American forces attempted to close the channel by sinking the collier *Merrimac,* the feat of Captain Hobson, but in this they were not completely successful. Acting on orders from Madrid, Cervera attempted to run the blockade, steaming out under forced draft on the third of July. The gunfire of the Americans proved to be vastly superior to that of the enemy, and after a brief but hot running fight, the entire Spanish squadron was sunk or beached. Commodore Schley, in Sampson's absence, directed the battle. Cervera himself was wounded. A land force under Major-General Shafter had reached the island on June 21 and after defeating the Spanish at San Juan and

El Caney, had invested Santiago. On July 4 the city was called upon to surrender, but it continued to offer resistance until July 17. With its fall Spain sued for peace.

By the treaty of Paris, Spain evacuated Cuba and relinquished Porto Rico, the Philippines and Guam to the United States, in return for a generous indemnity of $20,000,000. It was expressly understood that the American interest in Cuba was to be a simple trusteeship and that a republic, guaranteed by American arms, was to be established on the island. The war cost the United States $165,000,000. The loss of life, most of which was due to disease, was 2,910 for the American forces.

**Minor Incidents.** Dewey's flagship, the battle cruiser *Oregon,* was ordered to join the Atlantic squadron after the Battle of Manila Bay. It made the 12,000-mile voyage around Cape Horn in marvelous time and reached Cuban waters in perfect condition, ready for duty in the line of battle.

The war fixed public attention upon Commodores Schley and Sampson, who became rivals, or were made so by their respective champions. Both were advanced to the grade of rear-admiral.

Theodore Roosevelt, second in command of the "Rough Riders," had been assistant Secretary of the Navy and a reform politician in New York state. The war focused the nation's attention upon him, and his election as governor of New York followed the same year, from which post he was chosen Vice-President of the United States, and became President upon the death of McKinley. Colonel Wood of the "Rough Riders" remained in the service and by merit rose to the command of the American army. G.B.D.

Consult Wilson's *The Downfall of Spain: Naval History of the Spanish-American War;* Sigsbee's *Story of the Maine;* Lodge's *The War with Spain.*

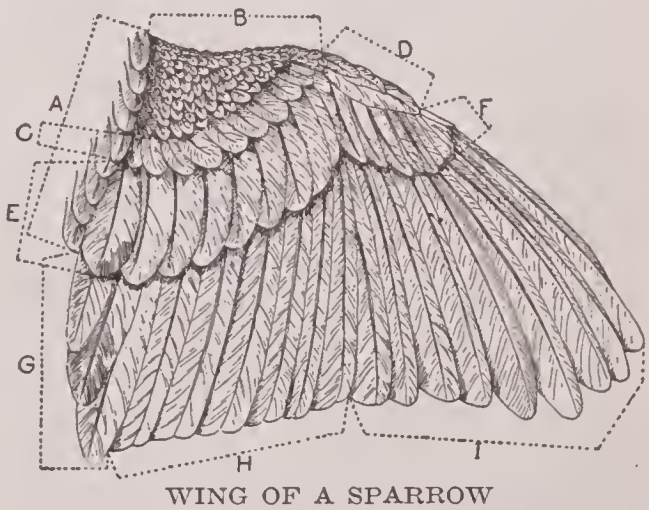
**Related Subjects.** Much supplementary information may be found in the following articles:

Cuba
Dewey, George
El Caney, Battle of
Hobson, Richmond P.
McKinley, William
Manila Bay, Battle of
Philippine Islands
Porto Rico
Roosevelt, Theodore
Rough Riders
Sampson, William T.
Schley, Winfield Scott
United States, subtitle *History*
Wood, Leonard

**SPANISH SUCCESSION,** *suk sesh'un,* WAR OF THE. See SUCCESSION WARS.

**SPARKS,** JARED (1789-1866), an American clergyman, historian, educator and biographer, distinguished as the pioneer in the collection of original documents relating to American history and as one of the earliest American biographers. He was born at Willington, Conn. After the completion of his theological studies at Harvard University, in 1819, he became a minister of the Unitarian Church in Baltimore. He resigned his pastorate in 1823, and from 1824 to 1831 was editor of the *North American Review.* From 1839 until 1849 he was professor of history at Harvard University, and from 1849 to 1853 he served as president of that institution. His greatest activity, however, was in the fields of biography and history. One of his best known works is his edition of the *Writings of George Washington,* in twelve volumes, the first volume of which is a biography of Washington. He also edited *The Library of American Biography,* the writings of Franklin and various collections of documents and letters. His great collection of manuscripts he bequeathed to Harvard University, and his private library was purchased by Cornell University.

**SPARROW,** *spair'o,* a plain-appearing song bird, with cone-shaped bill adapted to the shelling and eating of seeds, found in all parts of the world except the Australian region. Most species are migratory, those nesting in the




WING OF A SPARROW

(*a*) Scapulars
(*b*) Lesser coverts
(*c*) Middle coverts
(*d*) Ala Spuria (false wing)
(*e*) Greater coverts
(*f*) Primary coverts
(*g*) Tertiaries
(*h*) Secondaries
(*i*) Primaries

Northern United States and Canada wintering in the Gulf states. Among the best loved of American species are the *song sparrow,* with its clear, high trill; the *vesper sparrow,* with its sweet, plaintive note; and the beautiful *white-throated* and *white-crowned* sparrows. The largest of the groups is the *fox sparrow,* excepting the *Harris sparrow* of the Western prairies, a species about the same size recently discovered, having much black splashed about its head and breast. Both fox and Harris sparrows

gather in flocks on spring mornings and evenings and sing enchantingly in chorus. The *tree sparrow,* or *winter chippy,* and the *chipping sparrow* are marked with chestnut crowns. The *grasshopper sparrow* is a small ground bird with an insectlike note. The *field sparrow* frequents dry pastures and hillsides. The *seaside* and the *sharp-tailed sparrows* are found in salt marshes on the coast.

The *English,* or *house, sparrow,* a nondescript bird found about houses and villages in most parts of the Old World, was introduced into the United States in the middle of the last century and has spread with incredible rapidity to all parts of the country, driving out the native sparrows, wrens, martins, bluebirds, and even mocking birds, and replacing their songs with its continual strident chirpings. It rears three or four broods in a season, building in any available place of any available material, proving a pest about buildings, especially in eave troughs and drains. The eggs are five to seven in number, generally white in color, finely marked with olive.

Though some contend that the English sparrow is valuable in the destruction of the seeds of noxious plants, the general agreement is that we should be better off if we could exterminate the noisy little alien and invite back our former bird neighbors. M.A.H.

Consult Ridgway's *Birds of North and Middle America.*

**SPARROW HAWK,** the smallest of the hawks, measuring about ten inches in length. It breeds from Northern Canada to Northern Mexico, and winters in the Southern United States and south to Guatemala. Its back and shoulders are marked with reddish-brown and black, and its wings are a grayish-blue. It is commonly seen perched on dead trees, telegraph poles and other elevations, watching for its food, which consists of insects, small rodents, reptiles and sometimes smaller birds. It nests in holes in trees. The eggs are five to seven in number, creamy-white to reddish in color, marked with brown. Because of the good service it renders in destroying harmful insects and rodents, the little sparrow hawk should be encouraged and protected.

**SPAR'TA,** famed in Grecian history as the land of warriors and the abode of war, was the capital of Laconia, and at one time the most powerful city state in ancient Greece. It was picturesquely located in the northern part of the central plain of Laconia, about thirty miles from the Mediterranean Sea and on the right bank of the Eurotas River. Laconia was the southernmost division of that part of Greece known as the Peloponnesus (see map on page 3292). Sparta was in reality a community of five different villages having a common market place. The settlement lacked a rock citadel, such as its rival, the city of Athens, possessed in the Acropolis, but Sparta was so safeguarded from invasion by mountain barriers that it developed into a powerful state on the level plain, without even a wall about it.

**Early History.** According to tradition the city was founded by Lacedaemon, a son of Zeus by the mortal Taygete. The legend has it that Lacedaemon married Sparta, a daughter

LOCATION MAP

of Eurotas, and named the city for his wife. While many details of the authentic history of the settlement are unknown to us, it is generally accepted that the city was taken over by the Dorians, about 1000 B.C., when they invaded the Peloponnesus. These Dorians were the ancestors of the Spartans.

In the latter part of the ninth century a great lawgiver appeared—Lycurgus—who framed a new constitution or perhaps revised one already existing. The adoption of this constitution laid the foundations for the prosperity and growth of the Spartan state. It provided for two kings who ruled jointly, a senate of elders, twenty-eight in number, a governing board of five ephors, and a general assembly composed of all Spartan citizens over thirty years of age. Rigid military training was imposed, a system that produced men of iron nerve and women who said to their sons as they departed to battle, "Come home with your shield or upon it." This stern training deserves special description.

*Training the Spartan Boy.* Every Spartan belonged to the state from the time of his

birth, according to the laws of Lycurgus. When a boy was born his father was obliged to bring him before the elders to be examined. They decided whether the child should be reared or left to die. If it was robust and well proportioned they issued orders for its education, and assigned to it a certain share of land, as the Spartans were forbidden by law to engage in manufacture or trade. If, however, the child was weakly or deformed, its life was considered worthless and it was cast into a deep cavern in the mountains and left to perish.

A boy was left to the care of his parents until seven years of age, when he was enroled in a company consisting of fifteen members, all of whom were kept under the strictest discipline. From the age of seven every Spartan was compelled to take all his meals with his particular company in a public dining hall. The bravest boy in a company was made captain, and the others obeyed his commands and bore such punishments as he meted out to them.

When the boys were twelve, their undergarments were taken away, and only one outer garment a year was allowed them. Their beds consisted of the tops of reeds which were gathered with their own hands without knives. The arts of reading and writing were not considered essential, but leaping, running, wrestling and wielding a weapon with grace and accuracy were accomplishments which must be cultivated. At about the age of thirty the Spartan attained full maturity and enjoyed the rights and duties of citizenship. The sixtieth year closed the military career, and thereafter a citizen was employed either in public affairs or in the training of the young.

As a result of this system the Spartans became distinguished for the wonderful perseverance and patience with which they endured every conceivable hardship and suffering. From childhood, life was one continued trial of patience, and on certain religious occasions a boy would voluntarily ascend the altar and submit himself to the most cruel lashings. These sometimes lasted a whole day, and from them victims would frequently expire without a groan.

**The Rise to Supremacy.** After the organization of the state under Lycurgus Sparta gradually conquered all of Laconia. The territory known as Helos was utterly subjugated and its people were made state slaves. Another class also developed—the Perioeci ("Dwellers Around"). These were conquered people who were allowed to retain their lands and till them, but were compelled to pay tribute to the Spartans. In time of war they were forced to fight for their overlords. It is noteworthy that the Spartans, though absolute masters of Laconia, represented only a small proportion of the total population. Other conquests followed. Messenia, the most fertile district in the Peloponnesus, was subjugated between 740 and 630 B. C., and the Messenians were made serfs. By the middle of the sixth century the supremacy of Sparta was recognized throughout the Peloponnesus, and the city states in the north had begun to herald it as the leader of all Greece.

**The Decline.** Meantime a state beyond the Peloponnesus was rising to power—Athens—a state in which art, literature and philosophy were supreme. The Athenians joined with the Spartans in repelling the invading Persians, and Athens emerged from the struggle with enhanced prestige, eventually becoming the dominating power in Greece (see GREECE, subhead *The Persian Wars*). Athens, however, was conquered by its rival in the hard-fought Peloponnesian War, and in 404 B. C. was forced to accept a humiliating peace treaty. But the leadership claimed by Sparta was short lived. So cruelly did the Spartans rule over the other Greek states that they revolted and threw off the yoke. At the Battle of Leuctra, in 371 B. C., Sparta lost forever its claim to supremacy in Greece, and in 146 B. C. it passed with the rest of the country under the rule of Rome.

There is a modern town of Sparta near the site of the ancient city. It was laid out in 1834 and made the capital of the modern political division of Laconia. Excavations have been made on the old site, but no such interesting ruins as may be seen in Athens have been found. B.M.W.

Consult Botsford-Sihler's *Hellenic Civilization*.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Athens | Helots |
| Dorians | Lycurgus |
| Greece, subtitle *History of Greece* | Peloponnesian War |
| | Peloponnesus |

**SPARTACUS,** *spar'ta kus,* a Roman gladiator, the most famous of all time, although his glory was not achieved in the arena. He was the leader of a formidable slave rising, which nearly succeeded. Spartacus was born in Thrace, but was made prisoner by the Romans, sold as a slave, and taken for training to a gladiatorial school in Capua. With seventy comrades he escaped from the school, and de-

spite attempts of the soldiery to restrain him, established himself in the crater of Mount Vesuvius. Slaves seeking freedom flocked to him by thousands, so that he was able to overcome in battle several Roman forces that were sent against him.

Leaving his mountain fastness when he felt that his army was large enough, Spartacus succeeded in gaining possession of almost all of Southern Italy. Two consuls were sent against him, but he defeated them both and led his followers toward the Alps, meaning to lead them out of Italy, that they might be free and return to their homes. The slaves themselves, however, were determined to march on Rome, and compelled Spartacus to lead them, but they lacked courage when the critical moment arrived. A fresh army under Marcus Licinius Crassus was sent against Spartacus, and at first he defeated it as he had done before, but dissension broke out among his followers and in 71 B.C. a pitched battle resulted in the annihilation of his army. He himself, having stabbed his horse, fought on foot and showed incredible valor before he met his death. The rising practically died out with the death of the leader. See GLADIATORS.

**SPAR'TANBURG,** S. C., the county seat of Spartanburg County, is in the northwestern part of the state, seventy-six miles southwest of Charlotte, N. C., and 100 miles northwest of Columbia. It is on the Southern, the Carolina, Clinchfield & Ohio and the Charleston & Western Carolina railroads and on electric interurban lines. In 1910 the population was 17,517; it had increased to 21,365 (Federal estimate) in 1916. The area of the city is a little more than seven square miles. Spartanburg contains Wofford College for men and Converse College for women. Prominent features are the Federal building, city hall, Carnegie Library, Y. M. C. A. building and a $268,000 hotel. The city is in a productive cotton belt and has textile mills and fertilizer factories. The commission form of government was adopted in 1913.

**SPASM,** *spaz'm,* a more or less violent jerking and contortion of the muscles, is a symptom of several disorders. It is the most prominent symptom of epilepsy (which see), and is a common affliction of children suffering from intestinal trouble. It also occurs in many cases of poisoning, and is a late symptom of Bright's disease. The spasms, or "fits," that attack small children and babies should be treated as follows, according to the advice of a well-known specialist, Dr. L. E. Holt:

Keep the child perfectly quiet with ice at the head, put the feet in a mustard bath, and roll the entire body in large towels which have been dipped in mustard water (two heaping tablespoonfuls of mustard to one quart of tepid water), and have plenty of hot water and a bathtub at hand, so that the doctor can give a hot bath if he thinks it advisable.

If the convulsions have continued until the pulse is weak, the face very pale, the nails and lips blue, and the feet and hands cold, the hot bath will be useful by bringing blood to the surface and relieving the heart, lungs and brain.

The temperature should not be over 106° F.; this should always be tested by a thermometer if one can be obtained. Without this precaution, in the excitement of the moment, infants have frequently been put into baths so hot that serious and even fatal burns have been produced. If no thermometer is available the nurse may plunge her arm to the elbow into the water. It should feel warm, but not so hot as to be at all uncomfortable. One-half a teacupful of powdered mustard added to the bath often adds to its efficacy. C.B.B.

**SPAV'IN,** a disease of horses affecting the hock, or joint between the knee and the fetlock. It occurs in two forms, *bone spavin* and *bog spavin.* Bone spavin consists of a bony enlargement on the inside of the hock at the head of the shank bones or between the small bones of the shank. At first the spavin grows very slowly, and it may not be noticed until the horse becomes lame. No remedy has been found which will cure bone spavin, but blistering the part and allowing the animal several months rest may afford some relief. The disease is dreaded by horsemen, since it may render an otherwise perfectly sound animal nearly worthless.

Bog spavin is a soft swelling around the joint caused by the accumulation of synovial fluid (joint oil), and is usually caused by straining the joint. It is more likely to occur in young than in old horses. The treatment consists in hot applications, blistering and, as a last resort, "firing" with a hot iron, which should be done by a skilful veterinary surgeon.

**SPAWN,** the eggs of fishes, mollusks, frogs and reptiles, especially when found in masses. Usually they are produced in great numbers, particularly among sea animals which are preyed on by larger species or which leave eggs and young to hatch and develop alone. The production of countless millions of eggs by water-inhabiting animals is necessary to keep the different species from extinction. It is an interesting fact that fresh-water fish often deposit their eggs in the sea, while sea fish often ascend fresh-water streams during the spawn-

ing season. The collected masses of eggs of certain fish are often used in making the delicacy known as caviar.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Caviar | Frog |
| Fish, subhead *Reproduction* | Salmon |

**SPEAKER,** *speek'er,* the title of the presiding officer in the lower house of the law-making departments of various states and provinces. The speaker is the central figure in the United States House of Representatives, and his position in importance is deemed by many to be second only to that of President of the United States. In Canada the Speaker presides over the Dominion House of Commons at Ottawa; the presiding officer of the provincial assemblies is also given the title. The term had its origin in a custom of past centuries in Europe, when legislative bodies were addressed by the head of the government, and the presiding officer was expected to respond.

The duties of the Speaker are defined by the rules of the body which chooses him, and the dignity and character of the proceedings of the assembly are determined very largely by the ability, fairness and resoluteness of the Speaker. In most instances he has immense political power, which he too frequently uses in the interests of his party. See Representatives, House of.

**In the United States.** The Speaker is elected by his fellow members of the House of Representatives to serve during their term of office, which is two years—the length of life of one Congress—and he retains every privilege of voting and speaking, in common with every other member. When he wishes to speak upon any measure he calls another member to the chair and takes his place upon the floor of the House. The Speaker is supposed to open and close all sessions of the House, although he may delegate the duty at any time to another member; he is responsible for maintaining order; he rules on all questions of parliamentary law and procedure, and signs all official documents of the House.

The salary of the Speaker is $12,000 a year, $4,500 more than his fellow members of Congress receive, and the same as that of the Vice-President. His powers may be limited in any session of the House, for he is controlled by the rules the majority adopts, but with thousands of bills to be presented in rapid succession, and an unwieldy assembly of 435 members, the presiding officer must be able to exercise a great deal of power, or little would be accomplished. From 1790 to 1910, the Speaker had the right to appoint all committees of the House, and to select their chairmen. As these committees practically control legislation, this appointive power gave the Speaker a vast amount of influence. On March 19, 1910, after two days of contest, closing one of the fiercest parliamentary battles in the history of Congress, the right to appoint committees was taken away from the Speaker and given to the members of the House, who thereafter determined to make committee appointments in party caucus.

The Speaker is chairman of the committee which formulates the rules of the House and can therefore practically dictate procedure. He is the head of his political party in the House, and, unlike the rule in England, seldom drops his partisanship, even in official rulings. His partisans are in a majority and his party is therefore responsible for whatever the House accomplishes; it is also charged with whatever failures there may be in carrying out a legislative program, and the Speaker largely controls both situations.

The speaker of the house in the state legislatures is an official of like power but naturally within narrower limitations. His control of legislative situations determines to a considerable degree the progress and character of law-making for the state. His position in the state legislature corresponds with that of the Speaker of the United States House of Representatives, before the latter was shorn of his power to appoint the committees. In the states the speaker yet makes all committee appointments.

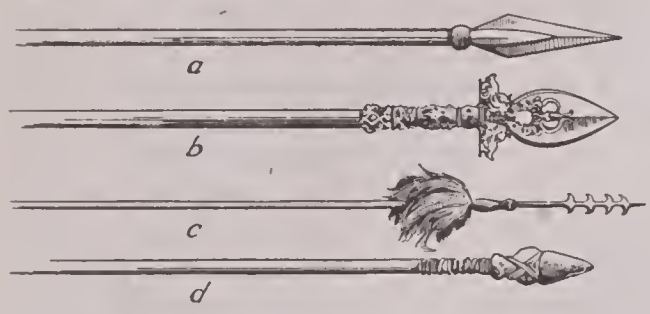
**In Great Britain.** In the British Parliament the Lord Chancellor acts as Speaker of the House of Lords. The Speaker of the House of Commons is always a member of that body, and is elected by the members, subject to the approval of the sovereign. There is a great difference between the power of the Speaker of the House of Representatives in the United States and that of the Speaker of the House of Commons in Great Britain. When the British Speaker takes the chair, he is expected to divest himself of all party ties and sympathies. When he dons the wig and gown of his office, he must lay aside all political preference, may express no political opinions, and must administer the same kind of impartial treatment to all members of the House. His position is one of great dignity, but carries no political power.

He never speaks in his capacity as a member of the body, and votes only in case of a tie. The symbol of his authority is the mace, which is carried before him by the sergeant-at-arms whenever he enters or leaves the House. It accompanies him on all state occasions, and stands on his table when he is in the chair. Both law and custom give the Speaker social precedence over all the commoners in the kingdom, and it is usual for the Crown to make a retiring speaker a peer, generally with the rank of viscount. His salary is £5,000 ($25,000) a year.

**In Canada.** See CANADA, subtitle *The Dominion Government.* E.D.F.

Consult Follett's *The Speaker of the House of Representatives;* Todd's *Parliamentary Government.*

**SPEAR,** *speer,* a long shaft of wood with a sharp, pointed head, usually of metal. With the exception of the club, the spear is the oldest weapon used by man. At first it was nothing more elaborate than a long, tough pole




SPEARS OF VARIOUS ERAS

(*a*) Roman; (*b*) German boar spear of the sixteenth century; (*c*) Philippine islanders' spear; (*d*) that of the North American Indian.

sharpened at one end and hardened in the embers of a wood fire. Presently the pole acquired a head of stone, harder and sharper and more dangerous than the wooden point. Next, the spearhead was made of bronze, then of iron, and finally of steel. The poison-tipped dart of the Australian bushmen, the Filipino's barbed and feather-tufted spear, the javelins, straight and slender, that have been hurled by soldiers and hunters all over the world, the medieval knight's long lance, crested with colors, the heavy and elaborately ornamented boar spear carried by some royal sportsmen—all these are but developments of that long, tough pole with which savage man attacked an enemy.

The spear was the most important weapon of ancient and medieval armies, and thousands were used as late as the French Revolution; and, while the bayonet of the common foot soldier is all that survives to-day of the twenty-foot pike of medieval warfare, certain regiments of mounted European soldiers, such as the English Lancers, the Russian Cossacks and the German Uhlans, carry long, light spears known as lances. A.C.

**SPEARMINT,** *speer'mint,* a species of mint found in temperate regions in most parts of the world, which yields an oil used in the preparation of perfumes and medicine and as a flavoring in chewing gum, candies, julep, soup and sauce. The world's most important center of spearmint distilling is Saint Joseph County, Michigan, which county also produces ninety per cent of the peppermint of the United States. The plant has smooth, erect stems that grow one or two feet in height and bear at the top whorls of pale purple or white flowers. It is this species of mint which furnishes the flavoring for mint julep as well as for the sauce which flavors lamb or mutton. See MINT.

SPEARMINT
In blossom.

**SPECIE,** *spe'shi,* **PAYMENTS,** RESUMPTION OF, is a term which indicates the beginning of circulation of specie (metal coins), or "hard money," as it is sometimes called, after a time of suspension of its use, during which time only paper money was circulated. Such suspension has occurred a number of times in the United States.

During the War of 1812 the United States government found it necessary to borrow more money than the State banks of the country could raise. This made it very hard for the people everywhere to obtain money, and it also kept money out of the banks, because people were afraid that if they did deposit their money they could not draw it out again. The

situation was so serious that the government authorized the banks of the country to suspend the payment of specie, or coin, and to give out only paper money, called then *credit money,* and in times of stress of uncertain value. The resumption of specie payments is usually very gradual, and it requires some time for the country to recover from the financial strain of such a crisis. In the instance referred to above, resumption did not begin until 1817, and it was several years before conditions were normal. Other similar experiences occurred in 1837-1838, 1846, 1857-1858, and a later one of most far-reaching effects following the War of the Rebellion.

**The Last Resumption.** The United States government was compelled to finance a very expensive war from 1861 to 1865 with its treasury ill prepared. The banks of the country were obliged to suspend specie payment in the closing days of 1861, for their specie was practically exhausted. Owing to the grave political conditions of the times—war at home, and danger of a war with England—the people began to hoard their gold and silver, instead of intrusting it to the banks. But one course seemed open to the statesmen of the time, namely to issue a large volume of United States treasury notes, generally called greenbacks, and compel their circulation as money by making the people accept them in all business transactions. This gave temporary relief, and two similar issues were afterwards made, so that by the end of the war there were over four hundred million dollars of such money in the United States.

The problem then was what to do with this mass of paper money. It was at first planned gradually to retire it by paying off a few millions each month, the Secretary of the Treasury being authorized to sell government bonds and use the proceeds for this purpose. About fifty millions were thus retired. The majority of the people believed, however, that the better way was to keep this money in circulation but make it as good as gold, and the only way to do that was for the government to stand ready to pay gold for it when demanded. In 1869, Congress solemnly declared it to be the purpose of the United States to pay the greenbacks in "coin or its equivalent." Accordingly, in 1875 a bill was enacted making arrangements to "resume specie payment" January 1, 1879. The Secretary of the Treasury was authorized to sell bonds and accumulate a store of gold for the purpose of redeeming, on demand, the greenbacks. But in 1878 Congress enacted that the volume of greenbacks then in circulation —$346,681,016—should not be retired when presented for payment, but should be reissued and paid out again and kept in circulation.

Many doubted the ability of the government to resume specie payment according to promise. The Treasurer accumulated a large fund of gold, and then it was discovered that the great mass of the people had no desire to exchange greenbacks for gold. They were as good as gold simply because the government was ready to exchange gold for them. In the next twelve years only about $28,000,000 were presented for redemption. January 1, 1879, marks the resumption of specie payment by the United States, and since that time all government issues of whatever nature are on a parity with gold. W.F.Z.

Consult Sparks' *National Development;* Dewey's *Financial History of the United States.*

**SPECIES,** *spe'sheez,* in the classification of plants and animals, a group of individuals which reproduce their kind. All members of one species are alike in various essential particulars and show a resemblance to a common ancestor. Several species are included in a genus, and a species is in turn divided into varieties. See CLASSIFICATION, for fuller explanation.

**SPECIFIC GRAVITY,** *spe sif'ik grav'i ti.* See GRAVITY, SPECIFIC.

**SPECTACLED, *spek'ta kl'd,* BEAR,** the name given to the only species of bear found in South America, so called from the light-colored circles around its eyes. It is a native of the Chilean and Peruvian Andes, and is a small animal with smooth, shiny black fur, marked with white on the jaws, throat and chest. Very little is known of its habits. See BEAR.

**SPECTACLES,** *spek'ta kl'z,* the name given to an instrument or device for aiding and correcting defective sight, consisting of a pair of lenses mounted in a frame to hold them in position before the eyes. The first device of this kind was invented probably by Roger Bacon, in the thirteenth century. It was crude and clumsy and was not greatly improved until the eighteenth century, when the grinding of lenses was first based upon the principles of the refraction of light.

The lenses are made of clear or rock crystal glass and are ground to suit the defect of the eye. In cases of nearsightedness, a concave glass is used; by this means the rays of light

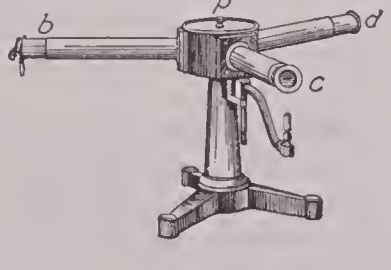
are diverged and a clear image is formed on the retina. For farsightedness, the convex lens is used, converging the light rays. The thicker the lens the greater is its magnifying power. Astigmatism, which is a structural defect of the eye, is remedied by cylindrical lenses which bring the rays of light to a common focus on the retina. The lenses are adjusted so as to make the distance of distinct vision about twelve inches from the eye.

When different lenses are needed for examining distant objects and those near the eye, *divided spectacles* are used. In these, each glass consists of two semicircles of different focal power; the lower and smaller section is used for reading and close observation and the upper section for looking at distant objects. When correctly fitted, spectacles can remedy most defects of vision, but if not exactly suited to the eye, they are injurious rather than beneficial. Therefore they should be fitted by a skilled optometrist and be changed when the eye changes. Colored glass is used in spectacles to protect the eyes from the glare of the sun.

The frame is made of tortoise shell or metal, usually gold, silver or steel. It consists of a bridge, rims, sides and bows which fit over the ears. Lenses supported on the nose by means of a spring and having no sides and bows are called *eyeglasses*. See LENS; EYE. C.B.B.

Consult Pettet's *Mechanics of Fitting Glasses;* Prentice's *Ophthalmic Lenses.*

**SPECTROSCOPE,** *spek'tro skohp,* an instrument for studying the spectra of bodies to determine their composition. (For a full explanation of the term *spectrum* see subhead under LIGHT, page 3425.) The simplest form of spectroscope is a triangular glass prism, and the method of using it is shown in the diagram under SPECTRUM ANALYSIS (which see). In a spectroscope of this sort the colors overlap. For the purpose of analysis it is necessary that each color be sharply defined, and this definition is secured by the use of a telescope and other tubes in connection with the prism.



SPECTROSCOPE
Explanation of the figure appears in the article.

The spectroscope in general use is shown in the accompanying diagram. It consists of a prism (*p*) enclosed in a case to which three tubes are attached. A tube (*c*), called the *collimator,* has a convex lens at the end nearest the prism and a slit at the other end. This slit is at the focus of the lens, so that the light admitted through it enters the prism in parallel rays. The slit is formed by two pieces of metal, one of which is movable and is operated by a screw with a very fine thread; thus the amount of light admitted to the prism may be carefully regulated. The colored image of the slit is magnified about eight times and is viewed through the telescope (*b*), which gives a sharply defined image. The tube *d* contains a graduated scale, the image of which is thrown upon the spectrum.

The compound spectroscope used in obtaining spectra of the heavenly bodies consists of a series of prisms arranged in the arc of a circle so that the spectrum is magnified by each before it is viewed by the observer. These spectroscopes are so constructed that they can be attached to the eyepiece of a large telescope. Astronomers measure distances and velocities of stars by means of the spectroscope. The dark lines appearing in the spectra of glowing bodies move towards one or the other end of the spectrum according as the body under investigation is approaching the observer or receding from him. Upon this principle astronomers have based some of their most remarkable discoveries. G.L.

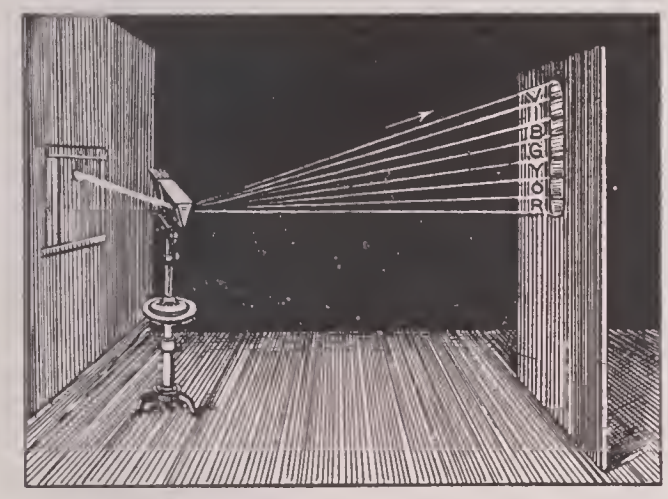
Consult Newall's *The Spectroscope and Its Work.*

**SPECTRUM,** *spek'trum.* See LIGHT, subhead *The Spectrum.*

**SPECTRUM ANALYSIS.** The effect of passing a beam of sunlight through a glass prism in a dark room is shown in the diagram on page 5489. The image of rainbow colors formed by this experiment is called the *solar spectrum* because it is produced most perfectly by sunlight, but it has been found that any glowing substance, such as molten iron or burning hydrogen, will produce a spectrum. Moreover, each substance forms a spectrum different from that of any other substance; therefore, by studying the spectrum of any substance we can learn its chemical composition. The term *spectrum analysis* is applied to this sort of study.

A spectrum that shows an unbroken array of colors from red to violet is a *continuous* spectrum, like that formed by sunlight. The spectrum formed from a single substance, like hydrogen, for instance, or that from a number of gases, is not continuous, but shows bands or lines of color separated by dark spaces, and it is known as a *bright-line spectrum.* Experi-

ment has shown that when the light of a glowing substance is passed through the vapor of another substance, this vapor absorbs the colors that appear in the spectrum of the absorbing substance, causing black lines to appear in the spectrum. A spectrum formed in this way is called an *absorption spectrum.* To illustrate, the interior of the sun is a glowing mass, but when viewed through the spectroscope, the




SPECTRUM ANALYSIS

(*v*) Violet
(*i*) Indigo
(*b*) Blue
(*g*) Green
(*y*) Yellow
(*o*) Orange
(*r*) Red

solar spectrum contains a number of dark lines which are caused by gases that surround the heated interior of the sun and absorb the colors that they produce in the spectrum.

**Fraunhofer Lines.** The different colors of each substance always appear at the same place in the spectra. Consequently, when a dark line appears in place of the color that a given substance, as sodium, would produce, it proves that the light from the substance under observation is passing through the vapor of sodium. These dark lines were discovered by Fraunhofer, a Bavarian optician, and in honor of their discoverer were named *Fraunhofer lines.* The German physicist Kirchhoff concluded that these lines were caused by the presence in the sun's atmosphere of those substances which themselves produce bright lines in the same position on the spectrum. That is, the spectrum revealed the substances of which the sun was composed. Further experiments showed the planets, including the earth, and the stars to be composed of the same substances. Concerning the importance of this discovery the eminent scientist Helmholtz said:

> It has excited the admiration and stimulated the fancy of men as hardly any other discovery has done, because it has permitted an insight into worlds that seemed forever veiled to us.

**Uses.** Spectrum analysis is employed in testing minerals for the discovery of new metals, and a number of rare metals, such as helium, have been discovered in this way. It is also employed in testing the purity of substances, since the minutest quantity of an adulterant can be detected. It is estimated that the spectroscope will detect the presence of as small a quantity as $\frac{1}{2500000}$ of a grain of lithium.

**Related Subjects.** The reader is referred to the following articles in these volumes:

Light, subhead *The Spectrum*
Rainbow
Spectroscope

**SPEECH,** the production by the vocal organs of articulate sounds for the purpose of communicating ideas. In a sense it means the same as *language,* but more accurately considered, the latter is the organized body of articulate sounds, while speech is the art of producing those sounds. Besides man, no animal so far as is known is capable of anything which may be correctly termed speech, but certain birds may be trained to imitate very closely the sounds produced by the human voice. Just how many sounds and modifications of sounds are used in the speech of mankind is not known, but scholars estimate them at approximately 1,000 in the 3,400 languages and dialects of the world. Since the vocal organs differ in their formation or development, sounds easy and natural to one body of people may be practically impossible to another, and few if any languages contain over fifty distinct sounds. See LANGUAGES OF THE WORLD.

**SPEEDOMETER,** *speed om' e ter,* or **CYCLOMETER,** *si klom' e ter,* a mechanical device attached to the wheel of a vehicle, indicating the distance traveled. In reality the speedometer and cyclometer, the uses of which are practically confined to bicycles and automobiles, are two different instruments, but they are closely connected in principle. The cyclometer, by a system of clockwork, set in operation by a cam on the spoke of a wheel, indicates the distance traversed. The speedometer has an extra attachment which causes the rate of speed, in miles per hour, also to be indicated on a dial.

A similar instrument is used by surveyors, and is attached to the wheel of a light vehicle, or to a wheel with a shaft or handle by which it is pushed along, each revolution causing clockwork to be set in motion. The number of revolutions is indicated on a dial, and from this, knowing the circumference of the wheel,

it is a simple matter to calculate the distance covered.

**SPEKE,** *speek,* JOHN HANNING (1827-1864), a famous English explorer, the discoverer of the source of the Nile River. He was born at Jordans, in Somersetshire, and entered the army when a boy of seventeen. During his service in India he explored parts of the Himalaya Mountains, crossing into Tibet, and in 1854 he went with Sir Richard Burton on his first expedition to Africa. After serving in the Crimean War he again accompanied Burton to Africa, their purpose being the exploration of the great lakes which report declared existed in the center of the continent. Lake Tanganyika was discovered, and in August, 1858, during the illness of Burton, Speke discovered the Victoria Nyanza, which he rightly considered the source of the Nile.

Burton discredited the theory, but in 1860 Speke was put in charge of an expedition for the further exploration of the Nile sources, with the result that the outlet of the lake into the river was found. Meeting Sir Samuel Baker, Speke gave him information which led to the discovery of the Albert Nyanza. His published accounts of his journeys appeared as *What Led to the Discovery of the Source of the Nile* and *Journal of the Discovery of the Source of the Nile.*

**SPELLING,** *spel'ing.* The ability to spell is everywhere taken for granted as one of the very basic facts of education. A man may "have no head" for mathematics; his penmanship may be almost illegible; he may have neglected literature entirely in his love for science; and yet those with whom he comes in contact may be ready enough to judge him a well-educated man. But if he misspells even those troublesome words which seem to lie in wait to catch the unwary he has proclaimed himself to his public as an uneducated man. True, such a judgment is often unjust, but it persists; and it is this tendency to judge a man's education by his spelling that gives to the subject its importance in school.

This importance has always been recognized, and a stress has been laid on the teaching of spelling which is somewhat out of proportion to its real importance in life. But the subject has always presented difficulties to such teachers as wish to make their teaching really vital. It seems a mechanical study, requiring practically no skill on the part of the teacher and furnishing little or no motive to the learner. A pupil studies his spelling lesson doggedly, as a stupid task imposed on him by authority, but it does not touch any of the interests of his life. Even the teacher who is willing to seek far afield for illuminating subject-matter—who can make a history or reading lesson as entertaining as a game—is likely to find herself baffled by the spelling lesson.

**The Change in Method.** There has been, however, in recent years, a decided change in the methods of teaching spelling; an organization of its facts and a relating of them to everyday concerns. The old method was comprised in the one word—drill. Lists of words, frequently unrelated, were assigned, and these the pupil muttered over to himself until he felt that sheer repetition had engraved them on his memory. The recitation consisted of the writing or spelling aloud of these words; and the teacher sometimes felt that she was imparting a touch of originality when she changed the order of the words, that the pupil might not have the mechanical assistance of an arrangement learned by heart. If pupils could not spell, their parents and even their teachers felt that what was needed was more drill.

In comparatively recent years, however, it has come to be an understood fact that drill is at the best but a clumsy tool; that a little earnest thought will take the place of a great deal of drilling.

To-day the difference is noticeable even in the assignment of the lesson. Possible mistakes are pointed out, modes of study are suggested, and devices are introduced for interesting the pupils in the derivation, meaning and proper use of words. Then, too, the spelling is kept so far as possible within the range of the pupil's interest; he is asked to spell only such words as he feels the need of knowing how to spell—only the words which are in his vocabulary. When it seems desirable to introduce new words, this is accomplished indirectly; the pupil is given the new experience, is then taught the words which describe it, and so is brought to feel, quite naturally, the necessity for learning how to spell the new words. This, of course, is the ideal method, but various modifications of it are necessary, since all pupils do not learn and use the same words at the same age and grade in school. Present-day textbooks, however, are based on the classroom experiences of many teachers, and so strike an excellent average. Each teacher, too, may supplement the textbook with grade lists, class lists and personal or individual lists, according to the needs of each pupil.

The old drill method often neglected the meanings of words; the present "thought" method lays as much stress on meaning and pronunciation as on spelling. It is not sufficient that a pupil be able to repeat glibly the definition of a new word; he must be able to use it in a sentence in such a way that it admits of no ambiguity. Each word should be made to call up as many associations in the pupils' minds as possible; in fact, spelling should become a real *word study*, and not a mere letter-by-letter study of words.

**The Use of Rules.** In arithmetic almost everything can be reduced to rule; in spelling comparatively few rules are possible, and these are no longer taught at the outset, as under the old method. Only when the pupils have mastered enough individual cases to make generalization seem reasonable are the rules introduced. When such derivatives as *plan, planning; compel, compelling; run, running,* have been mastered, the rule that "monosyllables and words accented on the last syllable, ending in a single consonant preceded by a single vowel, double the final consonent before a suffix beginning with a vowel" may be introduced naturally. All other rules, many of them cumbersome, are to be mastered, if at all, in about the same manner; they must follow and not precede their illustrations.

## *Spelling Reform*

As stated in the article PHONETICS, the ideal language would be one in which every letter had but one sound and every sound was represented by a letter. In such a language each word would be spelled exactly as it sounds, and spelling would be a very simple matter once the principles of phonetics were mastered. No speech in the world to-day attains this ideal, and English comes very far short of it. One has but to consider the pronunciation of *tough, though* and *through* to be convinced of this fact.

Many scholars in England and America have from time to time voiced their dissatisfaction with the chaotic state of English spelling, and have attempted to set on foot movements for so-called spelling reform, or simplified spelling. They have always, however, met with determined opposition; for while they may have reason and logic on their side, their opponents have sentiment on theirs—the affection of men and women for the ordinary word forms which they have always used and about which their associations have grown up; and sentiment is a far harder thing to conquer than reason or logic. In recent years, however, some advance has been made in popularizing the general principles of spelling reform.

The American Philological Association and the British Philological Society made recommendations for the simplifying of a number of English words, and the National Education Association of the United States adopted in 1898 the following "reform" spellings for use in its publications:

| | | | |
|---|---|---|---|
| altho | demagog | program | thorofare |
| catalog | pedagog | tho | thru |
| decalog | prolog | thoro | thruout |

In 1906 there was organized in New York the Simplified Spelling Board, which was endowed by Andrew Carnegie and headed by Brander Matthews. Its simplifications were somewhat more sweeping, and were included under sixty-one rules, or recommendations. The Board recommended, for instance, such changes as the following:

1. The use of *e* instead of the diagraph *ae*, except at the end of a word; thus, *medieval* for *mediaeval; ether* for *aether.*

2. The omission of the silent *b* before *t;* thus, *dout* for *doubt; dettor* for *debtor.*

3. The use of *e* instead of *ea* in words having the short *e* sound: *hed* for *head; helth* for *health.*

4. The dropping of final *gh* when it is silent; as, *thru* for *through; tho* for *though;* and the substitution of *f* in such words as *laf* for *laugh* or *tuf* for *tough.*

5. The substitution of *er* for *re* in such words as *theater, meter* or *scepter.*

6. The omission of silent *g* and silent *k* before *n;* thus, *nat* for *gnat; naw* for *gnaw; nock* for *knock; nife* for *knife.*

7. The substitution of *f* for *ph* pronounced like *f;* thus, *fantom* for *phantom; sfere* for *sphere; trofy* for *trophy.*

A complete list of these rules cannot well be given here, but a study of the above examples will show that some of the simplified forms have already made considerable headway. *Medieval,* for instance, no longer looks strange; *theater* is commonly used; and even *tho* has come to seem fairly familiar. Some of the forms, on the other hand, are as far from acceptance as they were when first suggested, and indications are that the struggle for completely simplified spelling will be a long and hard one.

In August, 1906, President Roosevelt issued an order that reformed spelling should be used

in government publications, but this order was afterward withdrawn. A.MC C.

**Spelling Reform in Canada.** The spelling reform movement in Canada arose responsive to the movement in England led by phonetic scholars contemporary with Ellis and Isaac Pitman. In July, 1858, the *Phonetic Pioneer* commenced to be published as a monthly, and was devoted mainly to the propaganda of phonography of the Benn Pitman variety until the end of 1862. In 1875 the American Philological Association moved in the matter, their efforts resulting the next year in the formation of the Spelling Reform Association; and in 1883 it joined the Philological Society of London, England, in recommending simplifications of spelling under twenty-four rules.

In Canada the newspapers took up the discussion at this date, the Toronto *World* leading; and this paper is still leading in the use of good spelling in Ontario.

*The Fonetic Herald* was first printed in November, 1884, at Port Hope, Ont.; in 1887 it was removed to Toronto. William Houston, one of the most progressive journalists and educators of Ontario, brought the reform to the attention of the University of Toronto, of which he was not only a graduate but a distinguished lecturer; and the *Globe,* of which he was for some time an editor, has been distinguished for a conservative orthographic progressiveness among many reactionary contemporaries.

In Nova Scotia in 1885, at the request of Dr. David Allison, superintendent of education, A. H. MacKay, then principal of the Pictou Academy, brought the subject before the Provincial Education Association. When in 1891 MacKay became superintendent of education for Nova Scotia, the council of public instruction authorized the provincial examiners of teachers and high school students not to mark against candidates any improved spelling recommended jointly by the Philological Societies, by the great dictionary editors, or by standard dictionaries. This was following generally the course of the Department of Public Instruction in France, which ordered that what would appear to be accidental spelling, if in the direction of approved reform, should not be marked against candidates for promotion in any grade.

In 1906 the international Simplified Spelling Board, with headquarters at New York, was organized, consisting of representative language scholars from all parts of the English speaking world; and shortly after another international organization, known as the Simplified Spelling Society, London, England.

Webster's Dictionary popularized many improved spellings throughout the United States and Canada. But the reformers in their days of youth congealed into the conservatives of old age, so that America is becoming more stereotyped than Great Britain, and at least one province in Canada has shown reactionary progress to the movement throughout the British Empire.

In 1911 an official conference of all the education departments of the Empire was called to meet in London. The representatives were appointed by their respective governments. One of the subjects considered was the improvement and simplification of the spelling of English, and at the conclusion of the discussion the Conference unanimously adopted the following resolution:

> That this Conference is of opinion that the simplification of spelling is a matter of urgent importance in all parts of the Empire, calling for such practical steps in every country as may appear most conducive to the ultimate attainment of the end in view—the creation, in connection with the subject, of an enlightened public opinion and the direction of it to the maintenance, in its purity and simplicity among all English-speaking peoples, of the common English tongue.

After this authoritative declaration of Imperial policy, Nova Scotia, Australia and New Zealand more or less promptly introduced a first instalment of simplification in their respective education departments. The Normal College of Nova Scotia has since been publishing its annual Calendar, using the list of 3,000 simplifications, in order to acquaint teachers with the recommendations of our best scholars. The *Daily News* of Truro, N. S., has successfully adopted the same advanced degree of reform as well as the *Normal College Gazette.* Two of the most widely circulated dailies east of Montreal, *The Herald* and *The Mail,* of Halifax, have adopted over 200 words, which are gradually coming into general use in the provincial press. A.H.MC K.

Consult Michaelis and Jones's *Phonetic Dictionary of the English Language;* Althaus's *Sounds of the Mother Tongue.*

**SPENCER,** *spen'ser,* HERBERT (1820-1903), an English philosopher, whose great work was his *Synthetic Philosophy,* was born at Derby. Due to delicate health in childhood, his early education was supervised by his father, whose ideas were far in advance of the age. From

1837 to 1846 the young man was in the employ of the London & Birmingham Railway, following which he served as subeditor of the *Economist,* until 1853. This position gave him wide opportunity for studying and writing and for acquaintanceship with the brilliant people of the period, among them being George Eliot, George Henry Lewes and John Stuart Mill.

HERBERT SPENCER

While working on his *Psychology,* which appeared in 1855, he further undermined his health, and suffered for the rest of his life from chronic insomnia and dyspepsia. The great scheme of his life was the proposed publication of a complete system of philosophy, in which he aimed to outline "in a sweeping, general formula the belief in progress which pervaded his age, and to erect it into the supreme law of the universe as a whole." A complete list of the titles of this *Synthetic Philosophy,* as well as all of his writings, concludes this article.

Spencer's philosophy is chiefly occupied with defining the fields of the knowable and the unknowable. He made neither clear nor definite his expressions regarding the latter, to which, as he found, belong The Absolute, The Infinite, Space, Matter, Time, Force and Motion. What he aimed to establish was that the very fact that we cannot solve ultimate metaphysical questions compels us to admit the existence of some supreme power behind the unknowable phenomena.

His great contribution to science lay on the positive side, where he dealt with the knowable, and aimed to reduce its laws to unity. The idea of evolution he applied, first, to all forms of organic life, and then to social and political institutions. He declared knowledge is gained by twofold experience, that of the individual and that of the race; inherited intellectual tendencies, therefore, are an important determining factor. The prevailing law which governs the phenomena of nature is the persistence of force: there is continuous order in all things and a prevalent suggestion of a common origin. Hence, despite his protests, he became a materialist, explaining everything by materialism. He declared all forms of phenomena to be the result of a passing from the simple to the complex. He explained the universe as a gradual development, instead of accepting the doctrine of creationism (catastrophal or accidental development), often seeming to fail to realize that evolution may be the history of origin, but that it can never be its explanation.

Evolution is his ultimate law of nature, counteracted by one other force, that of dissolution; whether or not there is progress, depends on the relative strength of the former. The same formulas that apply to the inorganic world he also applied in explanation of the relations of all phenomena in the organic, the political, the social and the ethical worlds. Thus he combined with his idea of the persistence of force that of natural selection and adjustment to environment (see Evolution).

Spencer stands as the great representative of the scientific movement of the last part of the nineteenth century. Many of his theories have been disproved by more recent investigations of specialists, but his masterly attempt to satisfy the need of a comprehensive survey of the world as a whole, in terms of facts rather than abstractions, won for him high rank among the great thinkers of all ages. To Spencer's *Synthetic Philosophy* belong the following volumes: *First Principles, The Principles of Biology, The Principles of Psychology, The Principles of Sociology* and *The Principles of Ethics.* His other works include *Essays: Scientific, Political and Speculative; Social Statics; The Study of Sociology; Education: Facts and Comments; Various Fragments; The Inadequacy of Natural Selection; Descriptive Sociology;* and his *Autobiography,* published in 1904. C.H.H.

Consult Compayré's *Herbert Spencer and Scientific Education*; Hudson's *Herbert Spencer.*

**SPEN'SER,** Edmund (about 1552-1599), a great English poet of the Elizabethan Age. He was born at East Smithfield, London, was sent to the Merchant Taylors' School, then became a student at Pembroke Hall, Cambridge, and in 1576 received from the university the degree of M. A. Two years later he was taken into the household of the Earl of Leicester, and in 1579 published his *Shepheardes Calendar.* This was dedicated to Sir Philip Sidney, who introduced the young poet to the court. In the next year he was made undersecretary to the lord-lieutenant of Ireland, and took part in restoring peace in that country at the time of Desmond's rebellion.

After the year 1586 he lived in Kilcolman Castle in Cork, as possessor of a large estate given him by the government. Here he continued the writing of the *Faerie Queene,* begun several years before, and upon the advice of Sir Walter Raleigh, who visited him in 1589, submitted the manuscript to the court. The only encouragement given him was a meager pension, and his *Colin Clout's Come Home Againe* shows his chagrin at his defeat. However, he published the first three books of his allegory in 1590, and they were eagerly received by the public. Somewhat later appeared a volume of short poems entitled *Complaints.*

EDMUND SPENSER

After his return to Ireland he married a lady whose given name, Elizabeth, alone is known. The courtship was described in the *Amoretti,* a series of sonnets, and the marriage was made memorable by the *Epithalamion,* the finest of English wedding songs. The year 1596 is notable as that in which appeared three more books of the *Faerie Queene; Foure Hymnes,* celebrating love, beauty, heavenly love and heavenly beauty, and the fine *Prothalamion.* At this time, too, was written the *Present State of Ireland,* not published for many years. All of his productions, however, did not advance him at the court, and he returned from another visit to England more discouraged than ever. Two years later his castle was broken into and burned by Irish rebels, and he narrowly escaped with his family. Not long afterward he died in a London inn.

The *Faerie Queene,* though not completed, ranks among the greatest narrative poems in the literature not only of England but of the world. It was the poet's intention to make the allegory consist of twelve books, in which twelve moral qualities should be embodied in as many knights, who should also represent some of the chief personages of the day, as Raleigh, Drake and others. However, only six books, and two cantos of *Mutabilitie* were written. The form of stanza used by Spenser has since been called by his name, and has been used by some of the greatest of English poets, as by Byron in *Childe Harold,* by Keats in the *Eve of Saint Agnes* and by Burns in the *Cotter's Saturday Night.* (See SPENSERIAN STANZA.) The music of the verse, the beauty of sentiment, and, above all, the exquisite fancies called into being by a wonderful imagination are the chief merits of Spenser's great poem. Many of the great poets who followed him have been profoundly impressed by the *Faerie Queene*—indeed, this is so true that Spenser is called "the poet's poet." A.MC C.

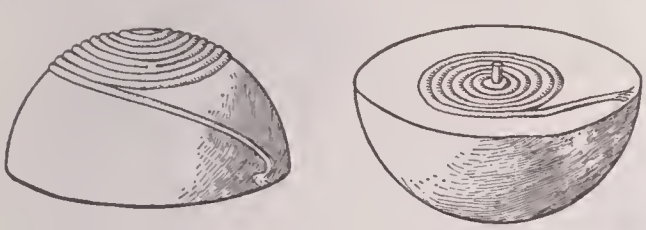
Consult Church's *Spenser,* in English Men of Letters Series.

**SPENSERIAN, STAN'ZA,** *spen se'ri an,* a verse form originated by Spenser for his *Faerie Queene.* It is a nine-line stanza, the first eight lines containing ten syllables each, the last twelve syllables, while the rhyme scheme is *ababbebcc.* It is a very stately form of verse, and while many English poets have attempted to imitate it, few have known how to handle it in a manner worthy of its inventor. The most famous poems written in Spenserian stanza since the *Faerie Queen* are Keats's *Eve of Saint Agnes* and Byron's *Childe Harold.* It is through this last poem, probably, that most readers are familiar with its stately music and its slow movement.

**SPERMACETI,** *spur ma se'ti,* a waxy substance obtained from cavities in the head and blubber of the sperm whale, widely used in making ointments and facial creams. In the whale spermaceti occurs as thick, oily fluid. By a process of trying out and cooling, this fluid is separated into sperm oil and a mass of flaky white crystals. The latter constitute the spermaceti of commerce. An ordinary whale yields about twelve barrels of the raw material. When purified spermaceti is a smooth, translucent solid, practically tasteless and odorless, and similar to tallow in appearance. It can be dissolved in hot alcohol and ether, and burns with a bright flame. Though formerly employed to a considerable extent in making candles and to give weight to dress goods, it is now valued chiefly as an ingredient of ointments and cosmetics.

**SPHERE,** *sfeer.* A solid bounded by a curved surface, all points of which are equally distant from a point within, is called a *sphere.* The point within from which all points of the surface are equally distant is called the *center.* The distance from the center to the surface is the *radius.* The distance from any point on the surface through the center to the opposite point on the surface is the *diameter.*

**Surface of Sphere.** Cut a sphere into two equal parts. Wind a cord about the whole convex surface of one of the hemispheres; then wind this same cord about the entire plane surface or base of the hemisphere (which is a *great circle of the sphere*). You will find that the cord which covered the *convex* surface will cover the *great circle* twice. Stated as a rule, this is expressed: *The surface of a sphere is equal to the surface of four of its great circles.* The area of a circle equals 3.1416,



[Explanation appears in text.]

or $\pi$ (pi), times the square of its radius (see CIRCLE). Therefore the surface of any sphere $=4\times\pi\times\text{radius}^2$.

What is the surface of a sphere whose diameter is 12 feet?

Surface in sq. ft. $=4\times3.1416\times6^2=452.3904$.

**Volume of Sphere.** Take a cylinder of the same diameter as a sphere, and of an altitude equal to the diameter of the sphere. (1) Fill the cylinder with water and in it place the sphere; hold the sphere firmly so that it rests on the base of the cylinder (does not float) and thus displaces its own volume of water. When the sphere is taken out the cylinder is found to be one-third full of water, which shows that *the volume of the sphere is two-thirds of the volume of the cylinder.*

(2) Place the sphere in the empty cylinder; fill in with salt, sugar, or sand; take out the sphere, and find that the salt, sugar or sand fills the cylinder to one-third of its height.

(3) The two solids may be made of clay or putty and weighed, and the relative weights noted.

All these experiments show that *the volume of a sphere is two-thirds the volume of a cylinder whose diameter and whose height are each equal to the diameter of the sphere.*

Volume of any cylinder = area of base × height

Volume of cylinder $=\pi\times r^2\times$ height

But in this cylinder the height is equal to diameter or twice the radius (see CYLINDER).

Volume $=\pi\times r^2\times 2r$

Volume $=2\times\pi\times r^3$

and

Volume of sphere $=\frac{2}{3}\times(2\times\pi\times r^3)$

Volume of sphere $=\frac{4}{3}\times\pi\times r^3$

Volume of sphere $=\frac{4}{3}\pi r^3$

Find the weight of a steel ball 20 inches in diameter, steel weighing 480 pounds to the cubic foot.

Volume of sphere $=\frac{4}{3}\pi r^3$

Weight in lb. $=\dfrac{4\times3.1416\times10^3\times480}{3\times1728}=1163\frac{5}{9}$

The surfaces of spheres are to each other as the squares of their radii. The volumes of spheres are to each other as the cubes of their radii or the cubes of their diameters. The volume of a sphere is, roughly, one-half the volume of a cube whose edge is equal to the diameter of the sphere. A.H.

**SPHEROID,** *sfe'roid,* a geometrical body resembling a sphere, but not perfectly round. In geometry a spheroid is a figure generated by an ellipse revolving about one of its axes. The spheroid is called *prolate,* or *oblong,* when it revolves about the longer or major axis of the generating ellipse; when it revolves about its shorter or minor axis it is said to be *oblate.* The figure of the earth is frequently referred to as an oblate spheroid, as its polar diameter is shorter than its equatorial diameter, and it is somewhat flattened at the poles. A figure generated by any axes of the ellipse other than the major or minor is called a *universal* spheroid.

**SPHINX,** *sfingks.* In Grecian mythology the sphinx was a wicked being usually represented as a lion, having the head of a woman, the tail of a serpent and the wings of a bird. This creature lived in a cliff just outside the city of Thebes, and kept guard over the road to the city. To every passer-by she put this riddle: What animal is it that walks on four legs in the morning, two at noon and three in the evening? And anyone who failed to answer correctly was immediately devoured. When Oedipus passed on the way to Thebes, the riddle was put to him, and without much hesitation he declared the animal to be man, who walked on his hands and feet when young, erect on his two feet in middle life, and with the aid of a staff in old age. With a howl of rage because her riddle had been read aright, the sphinx hurled herself from the rocks and was killed.

The Egyptian sphinx was not quite like the Grecian, but had the head of a man and the body, legs, feet and tail of a lion. It had no wings until a later period, when the Greek influence was felt. Originally, the sphinx was supposed to represent the god Horus, guardian of temples and tombs; and when sculptured, the face was probably made to resemble the Pharaoh who ruled at that time. Sometimes

sphinxes lined both sides of an avenue leading to a temple, as at Karnak.

The Great Sphinx now to be seen in Egypt stands close to the Great Pyramid at Gizeh; it is one of the most impressive monuments in

THE GREAT SPHINX

Egypt, and is carved out of solid rock, excepting the paws, which are built of masonry. The sands of the desert had half buried it, but they have been dug from about it, so that now the spectator looks down upon its massive paws. The great figure is 150 feet long, its head is thirty feet in length, and the width of its face is fourteen feet. These figures give some idea of its enormous size, but it is impossible to convey any idea of the expressiveness of its scarred features. The Arabs mutilated the face shamefully, using the head as a target for their guns. The age of the sphinx is unknown, but it is considered well established that it was in existence at the time of Cheops and was repaired by him earlier than 3000 B. C. A.MC C.

Consult Petrie's *History of Egypt;* Budge's *The Gods of the Egyptians.*

**SPHINX MOTH,** another name for the *hawk moth* (which see).

**SPICE,** the general name for a group of pungent and aromatic vegetable products, used chiefly to season foods. The various spices, such as pepper, nutmeg, cloves, ginger, allspice, mace, mustard, cinnamon and capsicum, are derived from different parts of plants; for example, cloves are procured from the bud, cinnamon from the bark, pepper and nutmeg from the fruit, ginger from the root, and mustard from the seed. The food value of spices arises not from their nutritive content, for their percentage of nourishment is small, but from the stimulating effect they have on the digestive organs. They should, however, be used with moderation, as excessive use of any seasoning is injurious. The cultivation of spice plants is an important industry in many tropical countries.

**Related Subjects.** The following spices are described in these volumes:

| | |
|---|---|
| Allspice | Cloves |
| Anise | Ginger |
| Caper | Mustard |
| Caraway | Nutmeg |
| Cassia | Paprika |
| Cinnamon | Pepper |

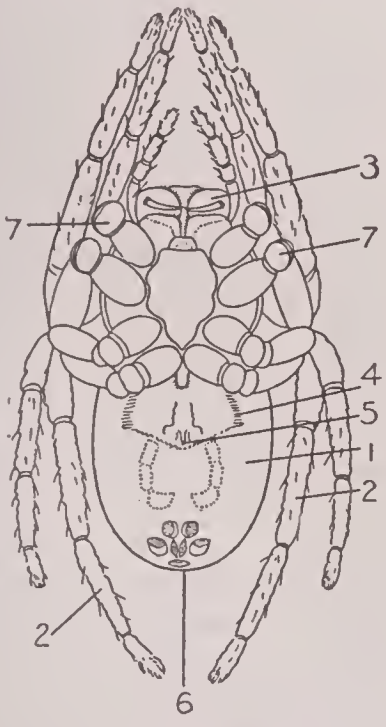
**SPICE ISLANDS,** a name sometimes applied to the MOLUCCAS (which see).

**SPI'DER,** a group of animals that are of special interest because of their ability to spin beautiful silken webs. The purpose to which some of these dainty gauze structures are put is known to every child who has learned the poem beginning—

"Will you walk into my parlor?" said the spider to the fly.
"'Tis the prettiest little parlor that ever you did spy;
The way into my parlor is up a winding stair,
And I have many curious things to show when you are there."
"Oh, no, no," said the little fly, "to ask me is in vain,
For who goes up your winding stair, can ne'er come down again."

Many an insect, however, is not so wary as the fly of the poem, and meets its death in the silken meshes.

**General Description.** The spider itself is not an insect, though zoölogists at one time included it among the *insecta*. According to modern classification spiders belong to a class called *arachnida* (which see), to which belong also mites, ticks and scorpions. Arachnids have two body divisions, a forepart consisting of a united head and thorax and an abdomen. In case of the spider the two parts are connected by a slender, flexible stalk. Insects have three body divisions.




EXTERNAL VIEW OF SPIDER

1. Abdomen
2. Fourth pair of legs
3. Mandible
4. Opening to breathing organ
5. Opening to reproductive organs
6. End of alimentary canal
7. Eyes

Another point of difference is the number of legs. Insects have three pairs, while spiders and nearly all other arachnids have four. The long, thin legs of a spider have seven joints, and they end in tiny claws. In some species the legs are so arranged that the animal can move in any direction—forwards, backwards and sidewise. There are two other pairs of appendages. These are in the nature of jaws, or mandibles. The first pair end in pointed fangs from which is ejected a poisonous secretion, used in killing the spider's prey. So small an amount is ejected that a human being bitten by a spider usually suffers no more discomfort than from a mosquito bite. The second pair of jaws is used in grasping and holding the spider's victim.

Most spiders have eight eyes, borne on the front of the head. Antennae, or feelers, are lacking. The breathing organs consist of two sacs, each containing several thin tissues arranged like the leaves of a book; slits on the underside of the abdomen open into these sacs. There are three pairs of spinnerets, small tubes borne on the end of the body. From these exudes a sticky liquid secreted by glands in the abdomen. This substance forms the silky threads of the web (see subhead below). The mouth is merely a slit, as spiders feed on blood sucked from other animals. The mouth is joined to a sucking stomach by a short tube, or oesophagus.

**The Weaving of the Web.** The spider does most of its spinning at night or in the early morning. It raises its spinnerets in the air and by gently pressing them against some object causes the liquid silk to flow out. The threads harden when they come in contact with the air and unite into one strand. With this thread the spider makes a suspension bridge, tightening it with its claws and firmly cementing it to a beam, leaf or wall. On several of these strands is hung the gossamer net, which is of various shapes. The web of the common house spider consists of a number of crisscross strands woven around the supporting spokes and forming an irregular wall around a central space. When any part of the web is broken the spider immediately makes repairs, but after it has spun several webs, its stock of silky fluid is for a time exhausted, and it often takes possession of the home of some other spider.

Of all the wonderful structures made by the lower animals, the orb web of the large black and yellow garden spider is the most delicately designed and skilfully made. This geometric web consists of delicate spiral strands fastened to spokes arranged like those of a wheel, and is fixed to a branch or leaf with threads resembling the ropes of a tent. The net is hung vertically, that flying insects may hit against it and be entrapped. The spider is never entangled in its own web because it runs on the

radiating strands, or spokes; the sticky, spiral threads are covered with minute, pearl-like drops of the glutinous substance to hold the captive insect firmly.

The delicate, filmy dome is another vertical web of the field and garden, and is suspended

WEB OF THE SPIDER

with the opening at the lower side. The single, shining threads which are often hung from grass stalk to grass stalk are spun by the young spiders. Sending out a thread of silk into the air, they float off with the breeze, and spinning more thread as they go, they are blown to new fields. The *flying,* or *ballooning, spiders,* thus sailing through the air, have been found in mid-ocean; it is in this way spiders are distributed over the globe.

**Habits and Characteristics.** There are numerous species of spiders, found all over the world, and differing considerably in habit. The largest, found in the tropical regions of South America, are two or three inches long. These creatures prey not only on insects but on humming birds. Another interesting species is the *trapdoor spider,* which makes a silk-lined burrow in the ground, and covers the entrance with a lid made of silk, leaves and soil. The *crab spider,* so-called because it can move backwards, assumes the color of the flower on which it lives, and hides in the heart of the blossom, waiting there for the unwary insect which will come in search of nectar. Another interesting group, the water spiders, build a water-tight, silken nest in the water, and inflate it by bringing down to it bubbles of air carried in the hairs on the body.

Spiders reproduce by eggs. The female, which is usually much larger than the male, makes a dainty silken cocoon for her eggs, which sometimes number many hundred. These egg cases are usually attached to the end of the mother's body. It often happens that the males are attacked and killed by their larger mates. It is usually the female that spins the web and obtains the food supply. Spider silk could be made commercially profitable for use in the textile industry if enough could be obtained. This is not possible, because any number of spiders placed together in an enclosure would eat each other up. These creatures are among the most shameless cannibals in the entire animal kingdom.

**Legends of the Spider.** There are many interesting stories and superstitions surrounding the spider. The lesson the patient spider taught Robert Bruce of Scotland is well known. Discouraged after six attempts to free his country from England, he was wearily watching a spider, which, after six attempts to fasten its web, in the seventh attempt succeeded. This persistence gave Bruce new courage, and he gathered together his forces and overthrew the English, making himself master of Scotland. It has since been considered a crime for anyone of the name of Bruce to injure a spider.

The old superstition that a fever could be cured by wearing a spider in a nutshell fastened around the neck is mentioned by Longfellow in the tale of *Evangeline.*

There is a pretty Greek myth explaining the spider's origin. It tells of a beautiful maiden, called Arachne, who boasted of her spinning and was punished for her pride by the jealous goddess Minerva, who changed her into a spider. B.M.W.

Consult Fabre's *Life of the Spider;* Comstock's *The Spider Book.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Antennae | Arachnida |
| Arachne | Mythology, page 4049 |

**SPI'DER WEB,** a structure spun by the spider to ensnare its enemy and protect its home. It is described in detail in the article SPIDER (which see).

**SPIKE'NARD,** or **NARD,** a costly perfume yielded by a plant of the valerian family, native to India. The root of the plant, which is shaped like a spike, or ear, of corn, bears at the top a cluster of thick stems about two inches long, and it is this part that is principally collected for the extraction of perfume. The precious ointment of spikenard mentioned in the Bible (see *Mark* XIV, 3-5, *John* XII, 3-5), was probably an oil or fat scented with the perfume. The odor of spikenard is not especially agreeable to people of Western countries, but those of the Orient have prized the

perfume for centuries, and the ointment was used by the Romans in connection with the bath. In Southern Canada and the Northern United States is found an aromatic herb which is used in making a tonic. This is called *American spikenard,* or *Indian root;* it is a relative of the sarsaparilla family.

**SPINACH,** *spin'aj,* or *spin'ech,* a popular garden vegetable cultivated for its leaves, which are cooked as greens and are also used in making soup. Though cooked spinach is nearly nine-tenths water and has only small proportions of protein, fat and carbohydrates, its delightful flavor makes it a very agreeable addition to a meal, and it is said to have slight tonic properties. This is one of the green vegetables that may be had during the entire winter, for the plant is hardy and can be grown during cold months. In the vicinity of Norfolk, Va., a tender, delicately flavored variety known as *Norfolk Savoy* is grown in large quantities for the Northern markets. Sowings are made in the fall and the crop is harvested at intervals during the cold weather. Farther north the plant is grown as an early spring crop. Spinach requires a rich soil, as plants grown in poor soil bear leaves that are tough and bitter. The seed is usually sown in drills an inch deep and a foot apart. There are two general classes: *prickly spinach,* with arrowheaded leaves and a fruit pod covered with spines; and *smooth spinach,* with round leaves and smooth fruit.

SPINACH

**SPI'NAL CORD,** the largest nerve trunk in the body. It is located in the spinal column, extends from the medulla oblongata to the lumbar vertebrae and is composed of gray and white matter. The spinal nerves branch off from it, and it is one of the centers of reflex action. For a full description see Nervous System, subhead *Spinal Cord.*

**SPINNING,** *spin'ing,* an ancient household industry that has found its way into great modern factories. It is a process of making threads by twisting vegetable and animal fibers, and was originally accomplished by means of a spindle and distaff. The spindle was a stick from nine to fifteen inches long, tapering at both ends and having a notch at one end for catching the thread, and the distaff was a staff upon which the fibers were bound in a loose coil. The spinner rotated the spindle by rolling it against the thigh with the right hand, while the fibers were gathered and arranged with the left. With such a primitive device the ancient Egyptians made threads that were woven into fabrics of the finest quality. Towards the middle of the sixteenth century the progress of spinning was aided by the invention of a spinning wheel (see illustration in the article Spinning Wheel). This was the type of spinning machine used by the housewives of New England in colonial days, which appears so often in picture and story.

Spinning, however, was destined to undergo a complete revolution. This was the result of three notable inventions of the eighteenth century—the spinning jenny of James Hargreaves, the cotton spinning machine of Richard Arkwright and the mule spinner of Samuel Crompton. Though numerous improvements were perfected during the nineteenth century, which vastly increased the output and made possible a product of higher quality, all modern machinery is based on eighteenth-century models.

Cotton spinning as carried on in a modern factory may be taken as a type. After the raw cotton has been cleaned and arranged into laps of uniform size, it is carried to the carding machines, equipped with huge rollers covered with wire teeth, where the tangled fibers are straightened out and made to lie in straight, even rows. Then the fibers are rolled over and over one another to form *slivers,* which look like loose ropes of soft cotton yarn. A sliver goes through the processes of *drawing, slubbing* and *roving,* by which it is twisted and retwisted and made continually finer and stronger. The concluding operations are carried out in the spinning machines, in which the thread is finally given the required twist, firmness and strength.

Consult Barker's *Textiles;* Byrn's *Progress of Invention in the Nineteenth Century.*

**SPINNING JENNY,** *jen'i,* a device invented about 1767 by James Hargreaves, of Lancashire, England, by which sixteen or more threads could be spun simultaneously. The name *jenny* is derived from *gin,* which was the local term for *engine.* In the spinning jenny spindles were placed vertically and were rotated by a wheel worked by hand. It was found of great advantage for spinning coarse thread but unsuitable for fine work. It was replaced by the *mule,* which contained most of the important features, with improvements.

**SPINNING WHEEL,** the first mechanical arrangement for applying a rotary motion to a spindle for spinning cotton or flax into threads. The principle was the same as that of the spindle used by hand, but by mounting the

AN OLD SPINNING WHEEL

spindle horizontally and passing a band or small belt from a groove in the spindle over a large wheel, turning the wheel by the foot gave the spindle a more uniform motion.

The material to be spun was carried on a distaff. The wheel was turned with the left hand or foot, the material being drawn out by the right hand. The degree of fineness depended on the rapidity with which the twisting thread was drawn out. For very fine thread two spinnings were necessary. See SPINNING.

**SPINOZA,** *spi·no′za,* BARUCH [BENEDICT] (1632-1677), a Dutch-Jewish philosopher, born in Amsterdam. His parents had fled from Catholic persecution in Portugal, and in the Netherlands he received careful instruction in Jewish theology. Under the influence of the philosophy of Descartes and Giordano Bruno, he broke with the Jewish faith, and his heretical views brought about his excommunication in 1656. He spent several years near Amsterdam, at Rhynsburg and Voorburg, finally removing to The Hague. In his insistence on maintaining a position granting absolute freedom of thought, he lived in solitude, depending on the profits from lens making, in which he was proficient, and declining both the position of professorship at the University of Heidelberg and the pension offered him by Louis XIV of France. His life was lonely, cheered only occasionally by the companionship of a few friends. The story that his days were saddened by an unsuccessful suit for the hand of the beautiful daughter of the learned physician, Van den Ende, is now generally discredited. Gentle, sensitive, heroic, with constitution weakened by consumption, he lived a life of seclusion, and in contemplation of God and spiritual realities tried to make vital and real the philosophy he taught.

His philosophy was derived from that of Descartes and developed into a complicated pantheism. It declared that God exists, and that His manifestations, or attributes, are two: extension (that is, the world of material things) and thought. It denied any causal relation between mind and matter, and so he had to apply a theory of parallelism to explain what was apparently interaction between the two. For every idea there was a physical object; for every material thing a corresponding particular idea. Though the physical and ideational causal series never interact, both are dependent on God, the Substance and Creator. Man is not free: God alone is free. That is, man is a limited manifestation of God, and God alone is Cause, Effect and Purpose. Man's attention must be riveted on the spiritual, for whenever particulars blind him and remain his ideal, harm and evil result.

His conception of God, wholly different from the Christian one, laid him open to charges of atheism. As he developed it into a philosophy it can better be described as an elaborate abstract monotheism. C.H.H.

Spinoza's occupation of lens maker should recall that in Holland the first telescope was made, and Amsterdam for many years led the world in the making of fine lenses. For a study of Spinoza's life, consult Joachim's *A Study of the Ethics of Spinoza.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

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| Atheism | Pantheism |
| Descartes, René | Philosophy |

**SPIRAEA,** *spi·re′a,* a genus of herbs and shrubs belonging to the rose family, widely distributed throughout temperate and cold regions of the northern hemisphere. They bear beautiful white, pink or rose-colored flowers, and many of the species are cultivated as ornamental plants. Common names of familiar species are *meadowsweet,* or *bridal wreath, dropwort, hardhack* and *willow-leaved spiraea.* Meadowsweet, a familiar garden shrub in

America, grows three or four feet high and bears slender, curving branches that in Spring are completely covered with clusters of tiny white blossoms. Willow - leaved spiraea is a popular florists' plant. It does not grow so tall as meadow-sweet, and the pink or white flowers grow at the tops of the branches in large, plumelike tufts.

SPIRAEA

**SPIRE,** in architecture, that part of a tower or steeple which rises from the top in the form of a pyramid. (For examples, see illustration under CATHEDRAL, page 1228.) The cathedral at Cologne, Germany, has spires over 500 feet high, while the finest spire in England, that on the Salisbury Cathedral, is 406 feet in height. The general effect of a building surmounted by spires is very striking. In Milton's *Paradise Lost* these lines occur:

> The glorious temple rear'd
> Her pile, far off appearing like a mount
> Of alabaster, topt with golden spires.

**SPIRITUALISM,** *spir'it u al iz'm.* The term usually refers to the modern form of the belief in the survival and communication of the spirits of the departed. This grew out of certain disturbances in a house at Hydeville, N. Y., in 1848; the disturbances appeared in the presence of the two Fox sisters and consisted of raps and mysterious moving of objects. By agreeing that one rap should mean "No," and three "Yes," the knocker revealed himself, in answer to questions, as the spirit of a murdered peddler. The movement found favorable soil and grew rapidly to enormous proportions. Mediums appeared everywhere and spiritualists were numbered by the hundreds of thousands; "seances" were widely held and spread to England and the Continent, at which eager sitters sought communication with deceased relatives, and in that intercourse found a religious consolation.

The seances took the form of movements, apparently without physical contact, of table tipping and floating of objects, of communications through the medium, who was sometimes in a trance state, of spirit materializations, of writing on sealed slates, and of a variety of startling performances which one and another medium devised. Prominent in the group were the performances in a "cabinet," which the medium entered securely bound, while bells were rung, tambourines played, chairs overturned and faces appeared almost as soon as the "cabinet" doors were shut; when opened, the medium seemed as securely bound as ever. Trance mediums contributed elaborate messages describing the spirit world and proving the identity of their source, often referred to the great personages of past ages.

This bare account of the movement gives no suggestion of the intensity of the interest and the absorption in mediums and their doings, which was widespread for two or three decades. Mediums were frequently detected in frauds of the most flagrant character, and the many failures were referred to unfavorable sceptical conditions. Investigations of a more or less critical character were made from time to time; but it was not until those made under the auspices of the Seybert Commission (1888) by the Committees of the Society of Psychical Research and by investigation with a knowledge of conjuring that the fraudulent character of most of the manifestations was minutely analyzed. See PSYCHICAL RESEARCH; CONJURING.

On the other hand, these newer investigations, together with the proposal of telepathy as a possible explanation, the trance revelations (of Mrs. Piper and others) and the automatic writings of unprofessional mediums, brought the spiritualistic hypothesis again to the front. Some investigators concluded that the revelations thus emerging, so far beyond the knowledge of the mediums, and the frequency of premonitions and apparitions corresponding with the moment of death of the person communicating, all pointed to the spiritualistic as the only adequate explanation of the source of the messages.

Historically, modern spiritualism is connected with the unbroken series of "occult" interests and manifestations that stand as the heritage of magical belief and gave rise to the pseudo-sciences (see SCIENCE AND THE SCIENCES, subhead *Pseudo-Sciences*). More particularly the performances of somnambules (see HYPNOTISM) in a "mesmeric" state set the pattern for the reading of sealed messages, seeing without eyes, and similar performances which formed the stock in trade of the spiritualistic mediums. Again the table tipping and rapping

were already current (particularly in France), and were readily used for spiritualistic communication; they are examples of unconscious movements (see SUBCONSCIOUS). Finally, the apparitions, haunted houses, noisy spirits have always been reported as part of popular belief and referred to a spirit origin. Thus modern spiritualism is essentially a revival of a general belief adopting newer modes of expression (and in its most recent phases raising issues more scientifically stated), which has a long history and has served to satisfy a certain type of interest and inquiry; such interest is closely related to the "occult." The loose character of the evidence, the invitation to fraud and self-delusion, the emotional interest in the issue, the contagious spread, the attraction of such beliefs to those of unstable mental disposition —all contribute to the readiness with which the spiritualistic performances were made to support unscientific belief and to conceal true motives for its popularity.

A critical investigation of spiritualism distinguishes the physical phenomena and the spiritual or revelational. The former consist of appearances seemingly defying the laws of physics; typically, they involve the assumption that the effect could not be ascribed to the ordinary agency of the medium. There is absolutely no connection between the failure to detect the manner in which the performance (or trick) is done and the conclusion that it is to be referred to a spirit. Nothing is more constant in the annals of spiritualism than the emphatic statement of investigators that fraud was eliminated, and yet the result was shown to be nothing more than a bare-faced or shrewd trick. Mediums have made international reputations, and there have been performances heralded as marvelous and endorsed by men of great reputation and scientific distinction; yet a proper investigation readily disclosed the method.

The best known of such instances is that of Eusapia Paladino, whose performances involved nothing more than the movement of a light table or the disturbance of objects in a draped corner, while apparently her hands and feet were controlled. As a fact, she is remarkably skilful in concealing the action by which she moves table and objects and in escaping from the control of the sitters. Substantially all the authentic performances of mediums have been repeated by conjurers; while in such tricks as slate writing the whole effect depends upon the illusion of the sitter that he has had constant sight of the slates, or upon the failure to detect the substitution of a prepared slate, or upon the action of the table to serve as a screen while the message is written under the table. A piece of gauze, a low light, an expectant atmosphere and a convinced sitter will create a recognized spirit; while releases from ties and knots prove nothing but the adroitness of the medium. The vulgar atmosphere of fraud surrounding the physical performances is established. Yet they have served an educational purpose in proving how treacherous is unimpeachable evidence, how elusive fraud may become, how technical is the skill needed to discover it, how readily bias makes marvels out of plain tricks.

The revelational evidence (apart from the crude answers to questions in an ordinary seance) is of a different nature. It depends for its value upon its intrinsic character; upon the probability that the medium could not have attained it by ordinary means; upon the corroboration of the revelations. This type of evidence is difficult to estimate; the opportunities for exaggeration and delusion are subtle; more than all else, the coöperation of the medium (who may be in a trance state) is indispensable, and is not readily secured. It is the impressiveness of cumulative revelation that makes converts to the spiritualistic hypothesis of survival and communication of the departed. While leaving as open-minded a reserve as is compatible with a scientific attitude, one may yet maintain that recent studies in psychology, which prove the extreme subtlety of the mind's operations and the large part played by subconscious tendencies, will eventually account for the revelational aspect of evidence. J.J.

Consult Abbott's *Behind the Scenes with the Mediums;* Flournoy's *Spiritism and Psychology.*

**Relating to Various Beliefs.** The articles on the following topics, while not bearing on spiritualism, are of interest in this connection:

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| Alchemy | Occult |
| Astrology | Palmistry |
| Clairvoyance | Phrenology |
| Conjuring | Physiognomy |
| Demonology | Psychical Research |
| Divination | Psycho-Analysis |
| Faith Cure | Suggestion |
| Hypnotism | Superstition |
| Magic | Telepathy |
| Medium | Theosophy |
| Mesmerism | Trance |
| Mind Reading | Witchcraft |
| Necromancy | |

**SPIROMETER,** *spi rom' e ter,* a device for measuring the capacity of the human lungs;

that is, the amount of air which can be expelled after a deep breath is taken. A spirometer in common use consists of two cylinders, the upper one made so as to move freely up and down when placed inverted within the other. To the upper cylinder are fastened a tube and an air cock, and the lower is filled with water. When the person under examination breathes into the tube the air is collected in the inverted cylinder and it rises in the water, the number of inches it moves being recorded on a graduated scale. From this record is computed the number of cubic inches of air expelled.

**SPITHEAD,** *spit'hed,* a roadstead, fourteen miles long and four miles wide, separating the Isle of Wight from the southern coast of England. It is the favorite anchorage of the British navy, and received its name from the Spit, a sandbank stretching south from the Hampshire shore for three miles. The sailors often call it "the King's bedchamber" because of the splendid protection from winds and the strong fortifications of circular towers, which were built in 1864.

**SPITZ,** or **POMERANIAN,** *pom er a'ni an,* **DOG,** a small dog averaging about eight pounds in weight and fourteen inches in height, having a foxlike face and sharp-pointed muzzle. The ears are erect, and the bushy tail is usually carried over the back. Its coat, beautifully soft and silky, may range in color from black through gray and red-brown to white; the pure, or white, dogs, the latter with a black-tipped nose, are considered the most desirable. In its native land, Pomerania in Prussia, the Spitz is used to tend sheep, but in America its only value is as a pet or fancy breed.

**SPITZBERGEN,** *spits'ber gen,* an Arctic archipelago to which no country lays definite claim, consists of five large islands—West Spitzbergen, or New Friesland, North East Land, Edge Island, Barents Island, Prince Charles Foreland—the Wiche Islands and many smaller islands. The geological formation is chiefly pre-Devonian granite, gneiss and schists. The ice- and snow-covered islands have no permanent inhabitants, their chief importance being their use as a starting point for polar exploration. It was from these islands that Andrée started in 1897 on his attempted voyage to the North Pole in a great balloon (see POLAR EXPLORATION).

Spitzbergen was discovered in 1596 by the expedition under Barents and Heemskerk, the Dutch navigators. It is the most northerly land in the world on which people can live, but is not accessible, for it is not in the lines of travel and there would be absolutely no profit in attempts to establish routes and plant colonies. However, the islands have a slightly higher winter temperature than that at Petrograd, the lowest temperatures rarely reaching —30°. Winter sets in early in September, and for four months the sun is continuously below the horizon, although for three or four hours of each twenty-four the darkness is relieved by faint twilight.

Consult Conway's *Early Voyages to Spitzbergen;* Greely's *Handbook of Polar Discovery.*

**SPLEEN,** the largest gland of the body not having a discharging tube. It lies below the diaphragm, to the left and a little back from the stomach (see illustration, page 7). In adults the spleen is about five inches long and three or four inches wide and weighs about seven ounces; it is soft and spongy, crumbles easily, and is a deep violet-red in color. The organ is a mass of cellular tissue covered by a fold of serous membrane from the *peritoneum,* or membrane that lines the abdominal cavity, which passes over it from the diaphragm, holding it in place.

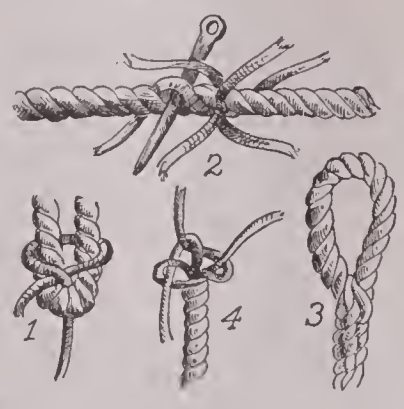
The function of the spleen is to help in the manufacture of blood, but in just what manner has not yet been determined. It can be removed completely without causing death, the other blood-manufacturing organs apparently substituting. It stores up nutritive material, forms both red and white corpuscles and is also supposed to change unknown matter into nitrogen. This organ is always enlarged during typhoid fever, possibly because it has to manufacture certain blood cells which fight and destroy disease germs, and is thus compelled to put forth additional effort. S.C.B.

**SPLICING,** *splys'ing,* the process of joining two rope ends without tying, by interweaving the loosened strands, which in turn are composed of yarns or fibers twisted together.

The three kinds of splices in general use are known as the *short, long* and *eye* splices. The short splice (Fig. 2) is made by placing the rope ends together in such a manner that each strand lies between corresponding strands in the second piece. The weaving of the first two is easy, but the placing of the third is more difficult; the rule is to "go over one and then under one." A long splice is not a long-woven short splice, but is made by raveling the strands back two or more feet, and then, after placing the ends together as in the short splice, con-

tinuing to displace one strand by laying the other in its place. Near the end of the strand the two are tapered, tied and the loose ends interwoven in the body of the rope.

If the rope is bent back and the end spliced into its own body, there is formed an eye or ring (Fig. 3). The method of lacing is the same as that used in making a short splice. To avoid friction that would soon wear out a rope that must bear a heavy weight, an iron thimble is often inserted in the eye splice.




SPLICING

(1) A rope end bent to form a ring, and a second rope tied or laced in; (2) short splice; (3) eye splice; (4) wall knot.

The three loose strands may themselves be intertwined in such a manner that a symmetrical knot is made at the end of the rope; this is called a single wall knot. There are few other methods of stopping a rope that are as practical (see Fig. 4).

A rope end may be bent back to form a ring or hook called a *bight,* and a second rope tied or laced in, as in Fig. 1. This is called a *becket hitch.*

**SPOFFORD,** *spof'erd,* AINSWORTH RAND (1825-1908), an American librarian, for many years librarian of Congress. He was born at Gilmanton, N. H., was educated by tutors, and became a bookseller and publisher in Cincinnati. From 1859 to 1861 he was associate editor of the *Daily Commercial* and in 1861 was appointed assistant librarian of Congress. Three years later he was made chief librarian, and he held this position until 1899, when he became chief assistant to Herbert Putnam, his successor. He wrote many articles on miscellaneous subjects for periodicals and edited *Library of Choice Literature; Library of Wit and Humor,* and an annual *American Almanack and Treasury of Facts, Statistical, Financial and Political.*

**SPOILS SYSTEM,** in politics, a system by which officeholders of all degrees of importance are dismissed after their party has been defeated in an election to make places for new appointees of the successful party. Great party leaders, with endless patronage at their command, have always rewarded their followers by giving them offices; this was true in ancient times as in modern. The only way to find enough places to supply the office-hungry partisans of a new administration is to turn out the holders, even though they are experienced and efficient. The spoils system brought inefficiency and corruption into every government in which it was ever tried.

In the United States the system found its greatest exponent in Andrew Jackson, whose friend, William L. Marcy, gave the system its name when he declared that "to the victor belong the spoils of the enemy," in politics as in war. Since the days of Jackson and Marcy, however, a feeling has arisen, not only in the United States, but in Canada, England and other countries, that governments are operated not for the financial profit of a few political leaders and their office-holding friends but for the benefit of the people. This spirit has slowly developed a new method of appointment to most of the offices in the governments of to-day, and this is described in the article CIVIL SERVICE IN THE UNITED STATES. See, also, JACKSON, ANDREW.

**SPOKANE,** *spo kan',* WASH., the county seat of Spokane County and the second largest city of the state, ranking next to Seattle. It is situated in the eastern part of the state, about midway between the northern and southern borders, sixteen miles west of the Idaho state line, and on the Spokane River. Seattle is 337 miles west, and Butte, Mont., is 359 miles southeast. Spokane is the greatest railway center of the Pacific Northwest, having the service of five transcontinental railroads and several other railway and electric lines; these are the Northern Pacific, the Chicago, Milwaukee & Saint Paul, the Oregon-Washington Railway & Navigation Company, the Great Northern, the Spokane & Inland Empire (electric), the Chicago, Burlington & Quincy, the Chicago & North Western, the Spokane, Portland & Seattle, the Spokane Falls & Northern, the Idaho & Washington Northern and the Washington Central. The city had a population of 104,402 in 1910; this had increased to 150,323 in 1916 (Federal estimate). The area is thirty-nine square miles.

Spokane is situated 1,900 feet above the sea; there is a magnificent view of picturesque lakes, broad, fertile valleys, and lofty mountain peaks covered with pine and evergreen forests. Through the city from east to west the Spokane River flows in a series of cascades having a total descent of 142 feet; the stream not only adds to the scenic beauty of the city, but even

at the lowest stage of water provides immense power for manufacturing purposes. At this point the river is crossed by several bridges; the one at Monroe Street, constructed at a cost of $530,000, has one of the longest single spans of concrete found in any bridge in the United States (281 feet).

**Buildings and Institutions.** Most of the buildings are of modern construction; the Federal building, erected in 1909 at a cost of $500,000, the city hall, the county courthouse, the Auditorium, Masonic Temple, the $2,250,000 Davenport Hotel, Elks' Lodge and the Paulsen, Old National Bank, Spokane Club and Review buildings are the most noteworthy. There are more than a hundred churches, the finest of these being the Roman Catholic and Protestant Episcopal cathedrals. Educational institutions include, besides the public schools, five parochial schools, Gonzaga University, Academy of the Holy Name, Brunot Hall for girls, Saint Stephen's School for boys and a public library containing 65,459 volumes. Saint Luke's and Sacred Heart hospitals, Saint Joseph's Orphanage, Home of the Friendless and the Deaconess Home are among the benevolent institutions. The Spokane division of the government postal inspection service is located here, and Fort Wright, a United States military post, is close to the city.

**Commerce and Industry.** Spokane is the commercial and industrial center of the "inland empire," a territory which embraces Eastern Washington, Northern Idaho and Western Montana. It is a region of rich mineral and agricultural resources, containing some of the largest silver-lead mines in the world, and valuable mines of gold and copper. Here the greatest area of pine timber forests in the United States is found, and crop failure in the territory is practically unknown. The region is also well adapted to stock raising (especially sheep) and dairying, and is a highly productive cereal belt, yielding large quantities of wheat. Spokane, through its shipping facilities, is the distributing point for this industrial district. One of the leading factors in the city's prosperity is vast water power, which supplies light for the city and power for the manufactories. Electric power, generated here, is transmitted to the famous Coeur d' Alene silver-lead mines a hundred miles distant. Lumber mills, flour mills, cereal food plants, sewer and water pipe works and paper mills are the largest establishments; jewelry, gloves and canned meats are also produced here.

**History.** Spokane is an Indian name meaning *children of the sun;* hence the city is locally referred to as *Sunny Old Spokane.* It was settled in 1872 by James N. Glover, and was originally called Spokane Falls. There were only 350 inhabitants in 1880. The next year it was incorporated as a city. It became the county seat in 1882, and the present name was adopted in 1890. The great natural resources of the region needed only the coöperation of railroads for the building of a city, and in 1883 the Northern Pacific Railroad constructed its line to this point. In August, 1889, the business section was almost completely destroyed by fire, but was quickly rebuilt. Spokane soon became a distributing center, and by 1892 eight railroads were entering the city, but the shipping facilities scarcely met requirements. Since 1884 growth has been steady and rapid. In 1910 the commission form of government was adopted. J.S.C.

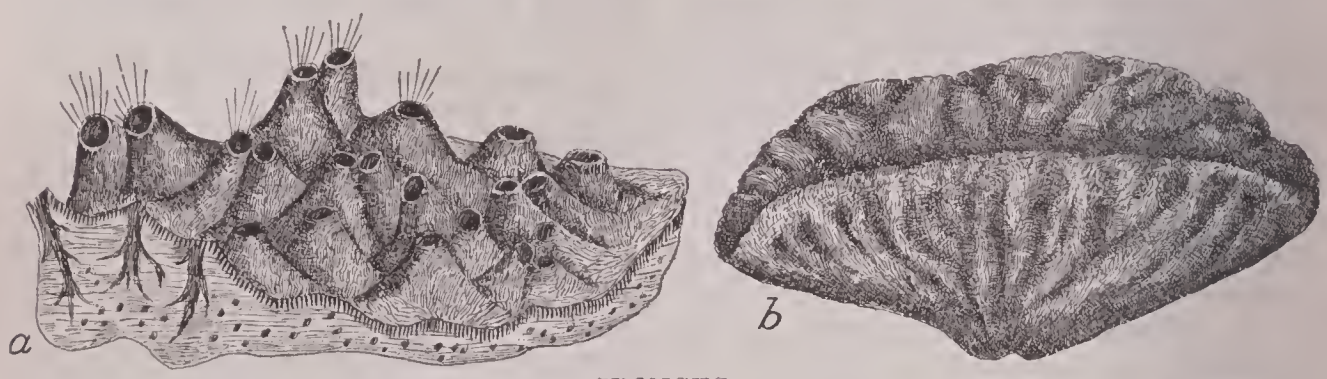
Consult Powell's *Historic Towns of the Western States.*

**SPONGE,** *spunj,* a sea animal whose skeleton, in a certain species, gives the world its commercial sponges. People used to consider it a plant; this was perhaps due to the fact that it cannot swim, but grows attached to shells, rocks, wharves or the sea bottom. It is curious to note that when it roots in mud it develops a stem in order to keep from being smothered. Living sponges are brilliantly colored, different varieties showing various shades of red, yellow, purple, blue and green, as well as brown and gray. While they are found in practically every zone, they develop best in tropical or the warmer temperate regions. They make their homes at all depths—close to shore and as many fathoms deep as the ocean has been explored by man—and have existed in all ages, for we find sponge fossils in the oldest rock, many of them corresponding to species that are common to-day.

**Structure.** The sponge is just one step higher than the simplest form of animal life, the single cell. Beginning with a tiny egg, it develops into a soft mass of slimy flesh made up of many individual cells, all formed through the continued division of the original cell—a process called *budding.* Each of these cells is like a bit of white of egg, and the group forms a colony which is bound together and supported by a strong, fibrous skeleton. The outer membrane of the sponge is extremely porous. From this fact the family derives its special name of *Porifera*—meaning, literally, *bearing*

*pores*. Through these countless minute openings the sea water streams in at all points, and is carried into every part of the sponge's body by a network of canals, or tubes. If we cut through an ordinary bath sponge these branching canals can be seen very clearly in the skeleton.

In the inner membrane, along the canals, are groups of cells provided with little lashes called *flagella (fla jel'a)*, which by their constant waving to and fro keep the water circulating. Thus the sponge is equipped with a perfect "irrigation system," by means of which the animal gets the food and air necessary for life; for the water brings oxygen, together with bits of plants and tiny living organisms, such as we see when we put a drop of water under the microscope. The sponge has no general stomach to digest this food; instead, each cell selects from the current whatever it needs, and as the water flows out through the large outer openings into which the canals empty it carries away all waste matter and surplus food.




SPONGES

(*a*) Exterior of a living sponge, which appears later in the stores as (*b*), the familiar bath sponge.

Sponges take many different shapes, some ordinary and uninteresting, others most graceful and fantastic. The form depends to a large degree upon the neighborhood in which they grow, for their soft tissue is, of course, very yielding. In shallow water, where there is more or less disturbance, they are usually irregular; those which grow in deep, quiet water are, as a rule, beautifully symmetrical and often very wonderful. Some sponges are thin and flat; some grow like low bushes with wide-spreading branches; some look like fans; others resemble cups, vases, or slender cylinders. In height they range from the merest fraction of an inch to over three feet.

**The Skeleton.** On account of the jellylike substance of which the cells are composed, a skeleton is very necessary to support and protect the animal. In some species the skeleton looks like lime or white marble; in others it is flinty or glassy in appearance. The exquisite, lacy *Venus's flower basket*, which used to be credited to skilled Chinese or Japanese craftsmen, is nothing but the framework of a dead *glass sponge*. These lime and flint skeletons are composed of myriads of tiny bodies called *spicules*, made of a substance secreted by some of the cells. In the form of delicate threads, slender needles, or oddly-shaped crystals resembling snow crystals, these spicules intertwine to make the solid mesh of the skeleton. Sometimes they push through the tissue and cluster around the mouths of the canals, thus barring out dangerous intruders. Another protective feature of the sponge is its very disagreeable odor, suggesting garlic—a highly effective weapon for keeping at a distance fish and other sea creatures that might otherwise make a meal upon its soft substance.

Besides the limy and glassy skeletons, there is a third class, characterized by elastic, horny fibers resembling silk; and it is this variety that provides the absorbent bath sponge.

**The Sponge of Commerce.** Sponges are gathered for trade purposes in various ways. In some localities, especially the Mediterranean Sea, where they grow in very deep water, they are collected by divers. In other places dredging is resorted to. The fisheries off the reefs of Florida use the harpoon method. Sponge-fishing crews go out in large vessels for many weeks at a time. The men are sent out from the ships in pairs, one to manage their rowboat and the other to do the actual fishing. By means of a glass-bottomed bucket the latter can see to a depth of sixty or more feet; and when he discovers a sponge of fair size he lets down his long forked pole and dextrously spears it. The sponges are spread about the deck or buried in sand until the flesh decomposes, and are then thrown into small pens filled with water, called *kraals*. From time to time they are beaten to dislodge the decayed

substance, and when thoroughly clean are strung and hung up to dry, after which they are ready for the market. Sometimes they are bleached to improve their color, but this makes them less durable.

The finest, softest sponges come from the Mediterranean, particularly from the neighborhood of Turkey; the next best grade is the Red Sea product. These foreign sponges are now scarce and command high prices. Nearly all the sponges used in the United States come from the fisheries of Florida and the Bahama Islands. The best grade of Florida sponges, called *sheep's wool,* bring from two to five dollars a pound; the ordinary *yellow sponge,* from fifty to sixty cents a pound; the very coarse *grass sponge,* from fifteen to twenty-five cents. The Florida fisheries average about 623,000 pounds yearly, valued at approximately $545,000. Although the Mediterranean fisheries produce a far smaller quantity than this, the value of their output is considerably greater on account of its superior quality. The weather has much to do with the size of the yield.

In recent years scientists have been experimenting with artificial production, since many of the richest sponge beds are now all but exhausted. The most promising method appears to be that of cutting up those sponges which are too small or irregular to be salable, and stimulating growth from these pieces, which are called *plants.* The United States government has passed special legislation to protect the Florida sponge fisheries from improper fishing methods.

During the War of the Nations there was a marked stimulation of the Florida sponge industry on the Gulf coast. This was largely the result of the difficulty of obtaining sponges from the Mediterranean beds. Tarpon Springs became the headquarters of activity, and the industry was developed chiefly by Greeks, who made use of diving apparatus instead of using the ordinary forked pole. These fearless divers are accustomed to plunging into water over 100 feet deep. Such methods enable the workers to obtain the very choicest specimens.

**Fresh-Water Sponge.** Although the sponge is properly a marine animal, a certain branch of the family (called *spongilla*) has adapted itself to fresh water. It is to be found in ponds, rivers and lakes in nearly all parts of the world, particularly where the water is quiet. One must look very closely to find these sponges, for they are only from half an inch to an inch long. They have the same porous, cellular bodies and supporting skeletons as their sea-born relatives, and the same habit of clinging to stones, leaves and other objects. However, they cannot boast the same vivid coloring or curious forms; they are green or grayish, and grow either in flat masses like tiny mats, or—in spots where the water is very still—as miniature bushes.

The principal difference between the marine and the fresh-water sponge is that in the latter there is provision for carrying the eggs over through the cold weather. Toward the end of the year there form within the grown sponge what are called winter buds—minute cells or eggs encased in a thick membrane, which fall to the bottom. They remain dormant until spring, and then multiply very rapidly through the process of cell division.

These fresh-water sponges are within every one's reach, and it is interesting to collect specimens in late summer, when they are fully developed, and preserve them in diluted alcohol. By studying them through even an ordinary microscope one can learn a great deal about this form of the many-celled animals. L.M.B.

Consult Moore's *Reports on Sponge Culture;* Cobb's *The Sponge Fisheries.*

**SPONTANEOUS, COMBUS'TION.** See COMBUSTION, subhead *Spontaneous Combustion.*

**SPONTA'NEOUS GENERA'TION, ABIOGENESIS,** *ab i o jen' e sis.* The theory that certain lower forms of life have sprung from substances without life is no longer held by scientists. As late as the seventeenth century, however, it was believed that life could originate from dead matter without the instrumentality of protoplasm. In no other way, for instance, could the presence of maggots on decaying meat be explained, or the formation of vegetable molds. With the perfection of the microscope and the development of the study of bacteria scientists have come to see that there is no life without antecedent life.

**Related Subjects.** The reader is referred to the following articles in these volumes:

Bacteria and Bacteriology
Fermentation
Mold
Protoplasm

**SPOON'BILL,** a wading bird, similar to the ibis, found in many parts of the globe, distinguished by its odd, spoon-shaped bill, which it swings from side to side in the water in search of shellfish, marine insects and small crabs. The most beautiful species is the *roseate spoonbill,* native to the warmer regions of the Ameri-

cas, though in Florida, where it was formerly abundant, it has been exterminated by plume hunters. The neck and the upper back of this bird are white and the rest of the plumage a rosy pink, becoming carmine on the wing coverts. It nests in colonies, returning year after year to the same locality. The nest is a platform of sticks, placed in low trees or shrubs. The eggs are five to seven in number, spotted and blotched with olive-brown.

**SPORE,** *spohr,* a minute body borne by lower plants, such as algae, ferns, mosses and lichens, which has the same function as a seed in higher plants—that of reproduction. Spore-producing plants, which are known as *cryptogams,* are of two kinds, those containing green coloring matter used in the manufacture of plant food (see CHLOROPHYLL), and those which must draw nourishment from other plants. It is the latter—smut on corn, cotton wilt, wheat rust, apple blight and the like—that are of special concern to the agriculturist, though there are some plants of this class that are harmless. A typical spore is a mass of protoplasm consisting of a single cell and having a nucleus and a cell wall. Many spores reproduce by cell division, but the process in higher forms of cryptogams is similar to that among the lower orders of seed-bearing plants.

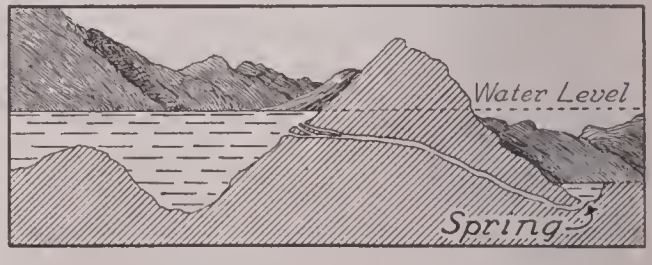
**SPOTTSYLVANIA,** *spot sil va' ni a,* **COURT HOUSE,** BATTLE OF, a series of battles of the War of Secession, fought in May, 1864, near Spottsylvania Court House, Va., about fifty miles from Richmond, between the Union army under Meade and the Confederate army of Northern Virginia under Lee. It was from the battle field of Spottsylvania that General Grant sent his famous message to General Halleck at Washington: "I propose to fight it out on this line if it takes all summer." After the campaign in the Wilderness, Grant began a movement toward Richmond. Lee, to check this plan, massed his army at Spottsylvania Court House before the Federal troops reached the place. There was intermittent fighting from May 7 to May 12, but the Confederates maintained their position. Both sides lost over 7,000 men. See WAR OF SECESSION.

**SPRAIN,** *sprayn,* a form of joint injury in which the tough, fibrous bands, or ligaments, which hold the joint in place, are torn or twisted. In a *strain* the ligaments are simply overstretched, and the injury is relieved by rubbing and rest. Sprains may occur at any joint but are most frequent at the ankle, owing to its bearing the weight of the body. Torn ligaments must be supported until they have healed. This was formerly accomplished by putting on a plaster cast, thus making it impossible to move the joint. A more modern remedy is the use of strips of adhesive plaster, which, if applied to the joint as soon as the accident occurs, or before swelling begins, form an artificial ligament. If no adhesive plaster is at hand, cold water should be used to keep down the swelling, and the joint be kept at rest until the plaster is procured. S.C.B.

**SPRAT,** a sea fish, one of the smallest species of the herring family, growing only about six inches long. It is often taken for young herring, but can be distinguished from the latter by the sharply-notched edge on the abdomen. Sprats live in shoals along the European Atlantic and Mediterranean coasts. They are caught in immense numbers with bag nets or seines, and make a cheap, wholesome food, being eaten fresh, smoked or pickled in brine.

**SPREE,** *spra,* a river of Germany which is an important route for the commerce entering and leaving the city of Berlin. The Spree rises in the kingdom of Saxony, on the boundary between that state and Bohemia, and winds its way in a northwesterly direction for 226 miles, emptying into the Havel River at Spandau, nine miles northwest of Berlin. Two canals connect it with the Oder River, and it has been deepened below Berlin to permit large vessels to enter that city. Berlin is traversed by several arms of the Spree, which divides and subdivides in its middle course to form a marshy depression known as the *Spreewald.*

**SPRING.** During a rainstorm a part of the water soaks into the ground and filters downward until it reaches a layer of rock or clay




THE ORIGIN OF A SPRING

through which it cannot pass. This layer may come to the surface farther down the slope, and if the water finds a channel along which it can flow it comes to the surface as a spring. Springs are most numerous in mountainous and hill regions. Sometimes they flow from crevices in the rock high up on the side of a cliff, but they are more frequently found at or near the foot of a cliff or some other slope. Some

springs are merely outlets of some underground streams, while others bubble up from a small opening. Some very large springs are the surface outlets of underground rivers. Most springs flow constantly except in seasons of severe drought, but occasionally we find those which flow periodically, sometimes at intervals of a few minutes or hours, and sometimes at longer periods. These are called *periodic* or *intermittent* springs. The flow of some of these springs is accounted for by the varying amount of water in the ground. They become active after a heavy fall of rain and usually flow during the spring, when the melting snow has saturated the ground. The flow of others is not understood.

The temperature of springs is nearly the same as that of the underground rock over which the water flows. Cool springs have deep sources, whose temperature is not affected by climatic changes. The temperature of these springs varies but little throughout the year. On the other hand, a spring whose source is near the surface will be much warmer in summer than in winter. In volcanic regions the water may come in contact with hot layers of rock, and when this occurs a hot, or thermal, spring is found.

Water, in filtering through the ground, dissolves carbonate of lime and various other minerals. Springs whose waters contain these substances in solution are known as *mineral springs*. Various gases, such as carbon dioxide, sulphureted hydrogen and nitrogen, are also found in the water of these springs. Some mineral springs have become noted health resorts because of the curative properties of their waters. Saratoga Springs, N. Y., the springs at Carlsbad, Germany, and the hot springs at Las Vegas, N. M., are good examples of such springs. W.F.R.

Consult Schlicter's *Motion of Underground Water,* in United States Geological Survey Bulletin No. 67.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Artesian Well | Thermal Springs |
| Mineral Waters | Water |

**SPRING,** that quality of a material by virtue of which it can "spring back," or resume a position from which it has been forced by tension. It is a characteristic of such materials as steel wire or rods, India rubber, whalebone or wood. The term *spring* is also applied to various devices and mechanisms.

In carriages, automobiles and other vehicles springs are used between the axles and the body of the vehicle to decrease concussion. In watches and clocks they are used to produce motion, being wound rather tightly around a central post, then gradually unwinding and imparting power to the mechanism. Springs may return to their natural position slowly, as in the case of the mainspring of a watch, or quickly, as in a gun or rifle, in which the spring is suddenly released from high tension, setting in motion the hammer, or pin, which explodes the charge. The quick action of a spring also occurs when a bow is bent and the cord is released. In the familiar spring-balance scales used in stores, the spring causes an indicator to move according to the tension. The weight of the article on the scale is ascertained, and when this is removed the spring resumes its normal position.

**SPRING'BOK,** or **SPRING'BUCK,** a species of South African antelope, the nearest ally of the true gazelles, so named from its habit of springing upward when alarmed or at play. Among the Dutch settlers it is known as *trek-bokken,* or *traveling buck.* Large herds travel through the country, clearing the plains of grass, and seemingly guided by instinct to seek those sections where rains have caused the vegetation to spring up again. These animals are a source of anxiety to farmers, whose flocks of sheep and goats they often kill. The springbok is exceedingly graceful, and the most slenderly built of all antelopes. Its coat is close and short, of a dull brown color, with a white stripe extending the length of the back. The horns curve in the shape of a lyre, and in the female are shorter and not so deeply ringed as in the male. The skin is valuable, and when in good condition the flesh is said to be excellent for food.

THE SPRINGBOK

**SPRING'FIELD,** ILL., the state capital and the county seat of Sangamon County, is centrally located in the state, 185 miles southwest of Chicago and ninety-nine miles northeast of Saint Louis. It is on the Sangamon River and on the Baltimore & Ohio Southwestern, the Chicago & Alton, the Chicago, Peoria & Saint Louis, the Cincinnati, Hamilton & Dayton, the Illinois Central and the Wabash railroads and on electric interurban lines. The population, which was 51,678 in 1910, had increased to 61,120 in 1916 (Federal estimate). The area is eight and one-half square miles.

Springfield is situated in the midst of rolling prairies, and the city is well planned. The state capitol, completed in 1887 at a cost of $4,000,000, is the most prominent feature. It is built of gray limestone and granite in classic style of architecture, and is surmounted by a massive dome (see illustration, in article ILLINOIS). Other fine public buildings are the supreme court building, Federal building, county courthouse, state arsenal, city hall, Y. M. C. A. and Y. W. C. A. buildings and the Lincoln Library. Here also are the State Library, the State Historical Library and the Supreme Court Library. Springfield is the seat of the Illinois supreme court and the United States district court. Leading institutions are the Bettie Stuart Institute, Springfield and Saint John's hospitals, two sanitariums and homes for the aged and for children. The city has 442 acres in parks, boulevards and playgrounds. The largest parks are Washington, Lincoln, Bunn and Bergen.

In Oak Ridge Cemetery is a splendid gray granite Lincoln National Monument (see illustration, ILLINOIS, opposite page 2927). The lower part is a mausoleum containing the remains of Abraham Lincoln and members of his family. In the center rises a shaft 121 feet high. At its base in front is a statue of Lincoln, and at the four corners are groups of statuary symbolizing the cavalry, navy, artillery and infantry of the United States. This monument, which cost about $350,000, contributed by people from every part of the United States, was designed by the sculptor Larkin G. Meade and was dedicated in 1874. Lincoln's old home in Springfield is owned by the state and is open to the public.

In Sangamon County are about forty coal mines, yielding an annual product worth approximately $6,500,000. In addition to large coal-mining interests, Springfield has printing and publishing houses, boiler and car works, an extensive watch factory and a large number of other manufactories. The annual value of products exceeds $11,000,000. Springfield, settled in 1819, was organized and made the county seat in 1823, and was incorporated as a town and made the state capital in 1837. It became a city in 1840. The commission plan of government was adopted in 1911, and the water and light systems are municipally owned. W.H.C.

**SPRINGFIELD,** MASS., the county seat of Hampden County, is in the southwestern part of the state, ninety-nine miles southwest of Boston and 103 miles southeast of Albany, N. Y. It is on the east bank of the Connecticut River, which is crossed here by several bridges, and on the Boston & Albany, the Boston & Maine, the Central New England and the New York, New Haven & Hartford railroads; it also has interurban lines. Within the city limits are included several villages, and the total area is about thirty-seven square miles. The population, which in 1910 was 88,926, had increased to 105,942 in 1916 (Federal estimate).

Springfield is an attractive city, with many fine public buildings. Chief among these is the municipal group, consisting of the Auditorium, which contains a fine pipe organ; the Administration Building and the Campanile Tower. The group cost $2,000,000, and was dedicated in 1913. Other noteworthy structures are the county courthouse, public library (and two branch libraries), Art Museum, Museum of Natural History, state armory, Federal building, the Church of the Unity and other religious edifices. Here are located the United States arsenal and armory. The arsenal was established by the Continental Congress during the War of Independence, and the armory, established in 1794, makes the largest part of small arms used by soldiers of the United States.

Forest Park (476 acres), with its fine animal and plant collections, is the principal recreation center. Several smaller parks contain fine pieces of statuary. One of the best known, *The Puritan,* by Saint Gaudens, was erected in Merrick Park, adjoining the library (see illustration, page 4874). A statue of Miles Morgan, by J. S. Hartley, and a memorial monument to soldiers and sailors of the War of Secession are in Court Square. Soldiers of the Spanish-American War are honored by a memorial monument in Carew Triangle. Hampden Park (54 acres) was once a famous race track.

The educational institutions include the training school of the International Young Men's Christian Association, the French American

College and several private schools. The leading hospitals include Wesson Memorial, Mercy, Springfield and the state hospitals. Manufacturing is the leading industry, and among the principal articles are firearms, railroad cars and supplies, confectionery, cutlery, electrical machinery, apparatus and supplies, foundry and machine shop products, and meat packing products. *Webster's International Dictionary* is published in Springfield.

William Pynchon led a party of emigrants from Roxbury, who settled here in 1636. The place was known as Agawam, after the Agawam Indians, until 1640, when it was named in honor of the English home of Pynchon. The settlement was burned by Indians during King Philip's War, and was the center of disturbance during Shays' Rebellion (which see). Springfield became a city in 1852. M.W.

Consult Barrows' *History of Springfield for the Young;* Tower's *Springfield, Past and Prospective.*

**SPRINGFIELD,** Mo., the county seat of Greene County, is in the southwestern part of the state, 200 miles southeast of Kansas City and 238 miles southwest of Saint Louis, on the Saint Louis & San Francisco and the Saint Louis, Iron Mountain & Southern railroads. The population, which was 35,201 in 1910, had increased to 40,341 in 1916 (Federal estimate). The area is about eight square miles. Springfield is attractively situated upon a plateau in the heart of the Ozark Mountains, at an altitude of 1,440 feet. It contains a state normal school and Drury College (Congregational), and its prominent buildings include a city hall and courthouse, erected at a cost of $250,000, a Federal building, a convention hall and a Carnegie Library.

The city has Phelps Grove, Walnut Grove, Washington and other parks, and in the vicinity are many places of scenic interest. The leading industrial plants include railroad shops, flour and lumber mills, wagon factories, machine shops and iron works. In this locality are productive lead and zinc mines. The city is an important poultry market, with annual shipments in this line amounting to approximately $8,624,000. Springfield was settled about 1819 and was incorporated as a city in 1855. The commission form of government was adopted in 1916. C.W.R.

**SPRINGFIELD,** Ohio, the county seat of Clark County, situated in the southwest part of the state, forty-five miles west of Columbus, the state capital. It is at the junction of Lagonda Creek and Mad River, and is served by the Cleveland, Cincinnati, Chicago & Saint Louis, the Detroit, Toledo & Ironton, the Erie, and the Pittsburgh, Cincinnati, Chicago & Saint Louis railroads; it also has an extensive system of interurban lines. In 1910 the population was 46,921; in 1916 it was 51,550 (Federal estimate). The area exceeds eleven square miles.

Springfield is the seat of Wittenberg College (Lutheran), Springfield Seminary and of many private schools. The city's more prominent features are a Federal building, erected in 1890 at a cost of $150,000, a handsome county courthouse and county office building, which together cost $200,000, a city hall, built at a cost of $250,000, and containing the city market and auditorium, Warder Public Library, Y. M. C. A. building, the state fraternal homes of the Masons, the Independent Order of Odd Fellows and the Knights of Pythias, and the Lagonda Club. The railroad stations are worthy of note, as are also a number of fine churches. In front of the city hall are the Kelly fountain and esplanade. Snyder Park, the largest of the city's playgrounds, contains 217 acres, beautified by landscape gardening; over the entrance is a memorial arch, erected by citizens to the memory of the donors of the park. The city hospital is finely equipped.

Power for manufacture is supplied by Lagonda Creek and Mad River, and in the vicinity natural gas is found. The leading products are various kinds of harvesting machinery and other agricultural implements, structural iron, windmills, engines, electric motors, undertakers' supplies and gristmill products.

**SPRING HILL,** a town in Cumberland County, Nova Scotia, in the northwest part of the province. It is on the Cumberland Railway & Coal Company's line, twenty-seven miles north of Parrsboro and five miles south of Spring Hill Junction, where connection is made with the Intercolonial. Spring Hill Junction is seventeen miles south of Amherst and sixty miles northwest of Truro. The town of Spring Hill is the distributing center of a coal-mining district, and itself has several small mines. Population in 1911, 5,713.

**SPROULE,** *sproul,* Thomas Simpson (1843- ), a Canadian physician and statesman, for more than a quarter of a century a Conservative member of the Dominion House of Commons. Sproule is also one of the leaders of the Orangemen; he was grand master of the Loyal Orange Association of British North America from 1901 to 1911, and in the latter

year was chosen president of the Imperial Grand Orange Council of the World.

Sproule was born in York County, Ont. He attended the University of Michigan, and later was graduated in medicine from Victoria University, Cobourg. He spent a few years in Michigan in the practice of medicine, but then returned to Canada and entered political life. From 1878 to 1915 he was a member of the House of Commons, for the last four years being Speaker. In December, 1915, he was called to the Senate. Sproule held strong views in favor of Protestant supremacy in Canada.

**SPRUCE,** *sproos,* a group of cone-bearing evergreen trees, closely related to the pines. There are about thirty species, all native to the northern hemisphere. Their northern limit is beyond the Arctic Circle, their southern, the

CONE OF WHITE SPRUCE

European Pyrenees, the Himalayas of Asia and, in North America, North Carolina and Arizona. Spruces have tall, tapering trunks with slender, horizontal branches, and their leaves, which are stiff and pointed, are set on woody projections. Their fruit is a woody cone.

The *Norway,* one of the ornamental species, is the most widely distributed and the most important European spruce. It is extensively planted because it grows rapidly and the wood is valuable as lumber. The mature trees are 150 feet high. Resin and turpentine are obtained from the wood, and the bark yields tannin, which is used in tanning leather.

The *white* and the *black* spruces are the most widely distributed of the North American spruces. The names denote the general tone of bark and foliage. The white spruce ranges north to Bering Strait and south to Michigan and Wisconsin. Its lumber is used for interior finishing and general building. However, the greatest value of its wood, together with that of the black spruce, is in paper manufacture. These two spruces, the black having a more confined range than the white, supply the largest amount of wood pulp for this purpose (see PAPER). From the resin of black spruce chewing gum is manufactured.

The *Engelmann* spruce, the white spruce of the Rocky Mountains and the Cascade Range, is a fine tree reaching a height of 150 feet. With the pines, it knows the mysteries of mountain solitudes, living in altitudes nearly two miles above the sea. The lumber is exceedingly valuable, but generally inaccessible.

The *Sitka* spruce, large forests of which are found in the swamps of the tidewater regions of Western United States and on the seaward slopes of the Alaskan mountains, is another important lumber tree. The *Douglas* spruce, called *Oregon pine* and *Douglas fir,* is, after the majestic sequoia, the highest tree of America, and the longest timbers cut are from its straight shaft. Its range covers 1,000,000 square miles, from California and the damp regions of the Pacific coast to Alaska. See SEQUOIA. M.W.

**SPURGE FAMILY,** or **EUPHORBIACEAE,** *u fawr be a'se ee,* a group of herbs, shrubs and trees comprising about 4,000 species, many of which are the source of very useful products. Castor oil and croton oil, cassava and rubber are among these products. The family includes also several ornamental plants, among them the poinsettia. Members of the spurge group bear small, inconspicuous flowers, but these sometimes have bracts (see BRACT) of very brilliant hues. A biting, milky juice is a common characteristic of the plants. In Africa there are several species that can with difficulty be distinguished from cacti when not in bloom. The group is widely distributed in temperate and tropical regions.

**Related Subjects.** For other details the reader is referred to the following articles in these volumes:

Cassava
Castor Oil
Poinsettia
Rubber and Rubber Manufacture

**SPURGEON,** CHARLES HADDON (1834-1892), one of the best known English preachers of the later nineteenth century. He was born at Kelvedon, in Essex, studied at Colchester and at Maidstone, and by the time he was fifteen years old had become usher in a school at Newmarket. Meanwhile he had joined the Baptist Church, and had begun to preach in and near Cambridge; his youthfulness attracted large audiences and a display of vigorous independence of thought succeeded in holding them. In 1854 he was made pastor of the Baptist chapel in New Park Street, London, and proved so popular that a larger building was demanded almost immediately. The great Metropolitan Tabernacle, which could seat 6,000 people, was

opened in 1861, and there he preached for the rest of his life, continuing always to attract great congregations.

His sermons, marked by a simple yet forceful style, intense earnestness and unfailing humor, were published each week, and reached all English-speaking countries. He also wrote *The Saint and His Saviour, John Ploughman's Talks, The Treasury of David, Types and Emblems* and *The Present Truth*, and edited a monthly magazine, *Sword and Trowel*. Out of his work at the Tabernacle there grew a system of schools and almshouses, a pastor's college, the Golden Lane Mission and the Stockwell Orphanage.

CHARLES H. SPURGEON
Probably no more famous preacher has lived in modern times.

The best life of Spurgeon is that by Shindler, published in 1892.

**SPY,** in military usage, a term defining any person who, while not wearing the uniform or distinctive badge of his service, mingles with the enemy to obtain information of value to the army he is serving. It is clearly agreed in international warfare that a soldier in uniform, no matter under what circumstances he is taken, cannot be considered a spy. To be condemned as a spy a person must actually be taken within the lines of the enemy, in disguise, or pretending to be other than he really is. Civilians openly carrying messages are not spies, and are not subject to the ignoble death meted out to those who have laid aside their uniform in the endeavor to penetrate the enemies' lines. Aviators and balloonists who reconnoiter or "spy out" the position of forces are not spies. A spy is one who acts clandestinely or under false pretenses.

Even a spy must receive trial before punishment. An ignoble death, by hanging or shooting, is prescribed in usages of war for all condemned spies. As an illustration of the status of a spy the celebrated case of Major André, hanged in 1780, affords a striking example. He was caught within the lines of the United States army, in disguise. Not being in uniform, he was not entitled to the treatment due to an honorable combatant. He was a spy. Had he reached the British lines and afterwards been captured, although known once to have acted as a spy, he must then have been treated simply as any other prisoner of war.

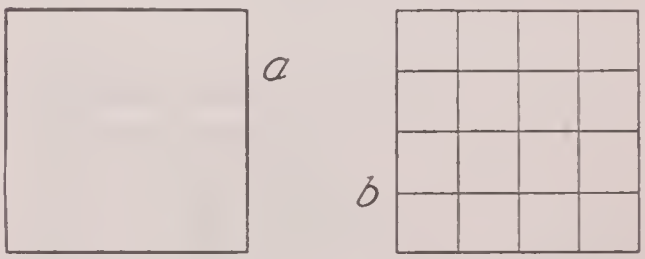
The term spy is also applied in time of peace to those who try to collect information in one country which then or at any other time would be valuable to another country. Special laws deal with such cases.

See HALE, NATHAN, for history of a devoted man who sacrificed his life as a spy.

**SQUADRON,** *skwad'run,* a naval and military term describing a division of a regiment of cavalry or fleet of ships. In the United States army a squadron is commanded by a major and consists of from 120 to 200 men, divided into three troops. A naval squadron may consist of a number of from two to eight war vessels, under the command of a junior flag officer.

**SQUARE,** a plane figure bounded by four equal straight lines and having four right angles (see *a* in diagram).

*The number of square units in a square is the product of the number of units in the length and the number of units in the width,* as in any rectangle. But since the length and width of a square are equal, the area is found by multiplying one side by itself, or by squaring one side. The square of a number is indicated by placing the exponent 2 to the right and above the figure denoting the number to be squared; thus, $4^2=4\times4$ or 16. In *b* of the accompanying illustration we have a square whose sides are each four units in length. The area is therefore $4\times4$, or 16, square units.




SQUARES
Explanation of figures appears in the text.

What is the area of a square city block 600 feet long?

One side = 600 ft.
Area in sq. ft. = $600^2$ = 360000

When the area of a square is known, one side may be found.

What is the side of a square whose area is 144 square feet?

The problem becomes: What number multiplied by itself gives 144? It is expressed thus:

$\sqrt{144}=?$ The answer, or 12, is called the *square root* of 144. The problem is expressed thus:

Area of square = 144 sq. ft.
1 side in ft. $=\sqrt{144}=12$

The *line* upon which a square is built is called the *root* of the square.

**Related Subjects.** In connection with this discussion of the square, the reader is referred to the following articles in these volumes:

Mensuration
Quadrilateral
Rectangle
Square Measure
Square Root

**SQUARE MEASURE,** the system used in the measurement of surfaces. The name is taken from that of the square, or the unit employed in finding the *area* of a surface. The table of common square measure is given in these volumes on page 1763, under the title DENOMINATE NUMBERS. For practical applications of the principles of square measure, see MENSURATION.

**SQUARE ROOT.** On a line 4 inches long build a square. The area of the square is 16 square inches. On a line 9 feet long build a square. The area of the square is 81 square feet. On a line 8 units long build a square. The area is 64 square units.

The drawing of many squares on cross-section paper, as suggested above, shows the meaning of a square, and makes clear the relation of the area of a square to one of its sides; namely, *the number of square units in the area is equal to the number of units in one side multiplied by itself.* This product is called "the square" of the number. "The square" is used to designate the product obtained by multiplying a number by itself, whether or not that product is thought of geometrically as a square. The square of a number is indicated by a little figure called an *exponent;* thus $4^2=16$; $9^2=81$.

The above are read: *4 squared=16; 9 squared=81;* or *the square of 4=16; the square of 9=81.*

The area of a square is 144 square feet. What is one side? 12 feet.

The area of a square is 169 square miles. What is one side? 13 miles.

Note the relation between areas and sides below.

| Areas | Side |
|---|---|
| 400 sq. ft. | 20 ft. |
| 36 sq. in. | 6 in. |
| 49 sq. yd. | 7 yd. |
| 121 sq. rd. | 11 rd. |

Finding the line upon which a square is built, or finding what number multiplied by itself gives a certain square, is called "finding the square *root* of the number," that is, finding the line or number out of which the square *grows.* And, as is usual in mathematics, there is a sign used to indicate what is sought; thus $\sqrt{25}$ stands for *the number which multiplied by itself makes 25.* The sign is called the *radical sign—root sign.*

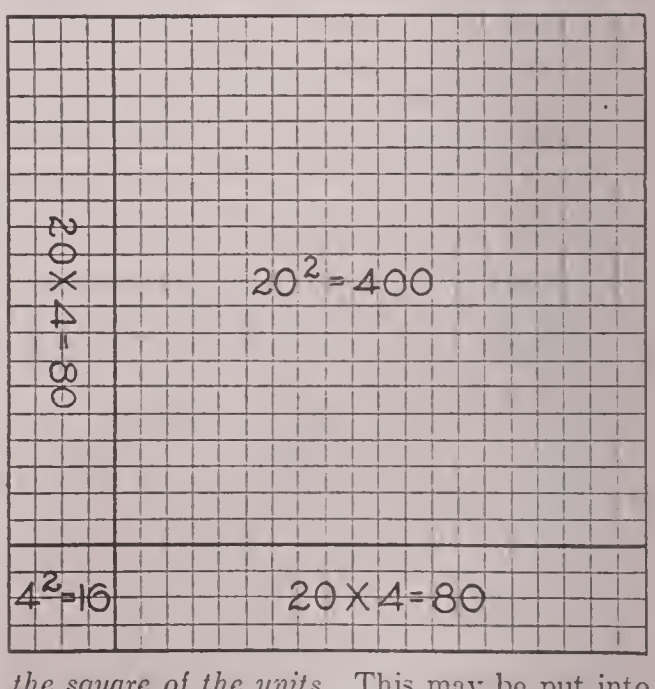
Find the values of the following:

| | |
|---|---|
| $3^2$ | $\sqrt{64}$ |
| $5^2$ | $\sqrt{6400}$ |
| $1^2$ | $\sqrt{144}$ |
| $14^2$ | $\sqrt{14400}$ |
| $30^2$ | $\sqrt{\frac{1}{4}}$ |
| $(\frac{1}{2})^2$ | $\sqrt{\frac{25}{100}}$ |
| $(\frac{2}{3})^2$ | $\sqrt{25}$ |
| $40^2$ | $\sqrt{.25}$ |
| $(2\frac{1}{2})^2$ | $\sqrt{.0025}$ |
| $17^2$ | $\sqrt{169}$ |
| $(\frac{5}{8})^2$ | $\sqrt{225}$ |

**Squaring a Number Consisting of 10's and Units.** Square 46.

$46 = 4 \text{ tens} + 6 \text{ units}$
$46^2=(40+6)^2$
$40 + 6$
$40 + 6$
$40 \times 40+(40\times 6)+(40\times 6)+6^2$
$40^2+2\times(40\times 6)+6^2$
$1600 + 480 + 36 = 2116$
$39^2=(30+9)^2=30^2+2\times(30\times 9)+9^2$
$39$
$39$
$81 = 9\times 9$
$270 = 9\times 30$
$270 = 30\times 9$
$900 = 30\times 30$
$1521 = 39\times 39$

*The square contains the square of the tens, twice the product of the tens by the units, and*




*the square of the units.* This may be put into a more concise form, thus:

$\text{number}^2=\text{tens}^2+2\times\text{tens}\times\text{units}+\text{units}^2$

Many numbers of this class should be squared on cross-section paper by students taking up the subject of square root.

The root is found by *taking the square apart along the lines upon which it was built up.* In other words, it must be taken apart along its *construction lines.*

**Square Root of Numbers Consisting of 10's and Units.** What number squared gives 2025?

$$n^2 = 2025$$
$$n = \sqrt{2025}$$
$$2025 = \text{tens}^2 + 2 \times \text{tens} \times \text{units} + \text{units}^2$$

$$\begin{array}{r|l} & 40+5 \\ & \overline{2025} \\ & 1600 = \text{tens}^2 \\ 2\times 40 = 80 & 425 = 2 \times \text{tens} \times \text{units} + \text{units}^2 \\ & 400 = 2 \times \text{tens} \times \text{units} \\ & \overline{25 = \text{units}^2} \\ & 25 = \text{units}^2 \end{array}$$

Explanation:

(1) What is the largest square of tens in 2025? 1600.

(2) What, then, is the tens? 40.

(3) Place 40, or 4 tens, in the root.

(4) Subtract 1600; the remainder 425 must contain $2\times\text{tens}\times\text{units}+\text{units}^2$.

(5) $\text{Units}^2$, being comparatively small, may be neglected for the time; and $425 = 2\times\text{tens}\times\text{units}$.

(6) The tens is 40; and $425 = 2\times 40\times\text{units}$.

(7) Divide 425 by $2\times 40$ and find units to be 5.

(8) Subtract $5\times 80$ from 425.

(9) The remainder must be $\text{units}^2$.

(10) It is found to be so—$25 = 5^2$.

When dividing by $2\times\text{tens}$, we must bear in mind that there must be a remainder equal to the $\text{units}^2$. The following problem illustrates the point:

$$\sqrt{784} = n$$
$$20+8 = 28$$
$$\begin{array}{r|l} & \overline{784 = t^2 + 2\times t\times u + u^2} \\ & 400 = t^2 \\ 2\times 20 = 40 & 384 = 2\times t\times u + u^2 \\ & 320 \\ & \overline{64 = u^2} \\ & 64 = 8^2 \end{array}$$

Note that when dividing 384 by 40, it seems that the quotient is 9. But upon taking out $9\times 40$ there is not enough left to give $\text{units}^2$; the remainder is 384—360 or 24, which is not $9^2$. So we see the quotient is only 8, giving a remainder of 64, which is $8^2$.

Squares of numbers from 10 to 100 have three or four digits; squares of numbers from 100 to 1000 have five or six digits. So the square root of any number of three or four digits lies between 10 and 100; that is, has two digits. The square root of a number of five and six digits lies between 100 and 1000; that is, has three digits. Therefore, in finding the square root, an integral number is separated into groups of two digits each, beginning at the right. The number of digits in the root is equal to the number of groups; for example, $\sqrt{72'25}$ has two digits, $\sqrt{1'63'84}$ has three digits, $\sqrt{10'49'76}$ has three digits.

A decimal number is divided into groups, *beginning at the decimal point,* and counting to the left and to the right; for example, $\sqrt{2'07.36}$, $\sqrt{2'08.22'49}$.

The usual concise method of solution is as follows:

$$\begin{array}{r|l} & 28 \\ & \overline{7'84} \\ & 4 \\ 2\times 20 = 40 & 3\ 84 \\ +8 & 3\ 84 \\ \overline{48} & 0 \end{array}$$

Here the zeros showing the full value of tens and $\text{tens}^2$ are dropped, and units when found is added to the "trial divisor" ($2\times\text{tens}$) before multiplication, thus including the square of the units in the product. With students taking it up in arithmetic, the first method given here is much more easily understood.

**Square Root of Numbers of More Than Four Digits.** Find the square root of 104976.

$$\sqrt{104976} = n$$
$$300+20+4 = 324$$
$$\begin{array}{r|l} & \overline{104976} \\ & 90000t^2 \\ 2\times 300 = 600 & 14976 \\ & 12000 = 2\times t\times u \\ & \overline{2976} \\ & 400 = u^2 \\ 2\times 320 = 640 & 2576 \\ & 2560 = 2\times t\times u \\ & 16 = u^2 \\ & 16 = 4^2 \end{array}$$

After 320 is found, we know there are 32 tens in the root, and after taking out $20^2$, or 400, we proceed to find units. The process is shortened below:

$$\begin{array}{r|l} & 324 \\ & \overline{10'49'76} \\ & 9 \\ 2\times 30 = 60 & 149 \\ 2 & 124 \\ \overline{62} & \\ 2\times 320 = 640 & 2576 \\ 4 & 2576 \\ \overline{644} & \end{array}$$

**Square Root of Decimal Numbers.** 1. A product contains as many decimal places as the two factors that make it.

2. The square is a product and the factors are equal.

3. Therefore a square always has an *even* number of decimal places, and the root has one-half as many decimal places as the square.

4. To find the square root of a decimal number (a) work as if it were an integer; (b) point off one-half as many decimal places in the root as there are in the square.

$\sqrt{1.44}=1.2$ $\qquad$ $\sqrt{.0009}=.03$

$\sqrt{.64}=.8$ $\qquad$ $\sqrt{2.25}=1.5$

$\sqrt{.625}=\sqrt{.6250}=n$

```
      .79
    .62'50
      49
2×70=140 | 1350
       9 | 1341
  149       9
```

Note that .625 has but three decimal places; add one place so that it has an *even* number of decimal places.

A root is carried out as many decimal places as desired by annexing *two* decimal zeros to the square for *each* decimal place desired in the root; for example, find $\sqrt{3}$ to two decimal places.

```
      1.73
    3.00'00
      1
2×10=20 | 200
     +7 | 189
     27 |
2×170=340 | 1100
     +3 | 1029
  343
```

A.H.

**SQUASH,** a plant of the gourd family cultivated for its fruit. It is a familiar and well-liked garden vegetable. Squash is cooked in various ways. It is most commonly served in the same way as mashed potatoes, or used as

TWO VARIETIES

In rear, summer squash; in foreground, crookneck squash.

filling for pies. The plant grows as a trailing vine and as a bush, and bears large green leaves with many lobes, and large, tubular, orange-yellow flowers. There are two general kinds, the *summer* and the *winter.* Summer varieties, represented by the *crookneck,* usually grow as bush plants. The fruits are usually smaller than winter varieties, and the plants have hard, dense stems. Summer squash will grow in the shade of cornstalks or in a sunny situation, and will endure both heat and drought, as this type adapts itself readily to almost any condition. A summer squash is gathered and eaten before fully ripe.

Winter varieties, represented by the *Hubbard,* are usually vine plants. The fruits are heavy and thick-skinned. They are allowed to come to maturity but must be gathered before frost injures them, and if stored in a dry

WARTED HUBBARD SQUASH

place they will keep through the winter. The best-liked varieties retain their green color when ripe. Squashes do best in a soil containing a good deal of humus. Bush varieties are planted in hills about four feet apart each way, but trailers need more space.

**Squash Bug,** an ill-smelling insect that attacks both squash and pumpkin vines. It is slightly more than half an inch long, and is brownish-black above and dirty yellow below. Adult insects sleep through the winter. The eggs are laid in the spring on young leaves and sprouts, and the young hatch in about two weeks. They injure the growing plants by sucking the sap. There are several measures used to combat the pest. One of these is picking the bugs off the vines before the eggs are laid. Young plants should be protected by means of frames covered with mosquito netting. Bugs can be trapped under shingles placed about the vines, and then be destroyed. Any egg clusters which are found should be crushed. M.K.

**SQUATTER SOVEREIGNTY,** *skwat'er sov'er in ti,* or **POPULAR SOVEREIGNTY,** in the history of the United States, was the doctrine that the inhabitants of a territory had the right to regulate their internal affairs without interference from the national government. Whence or from whom the theory came is not known, but its first public statement by a man of prominence was in a letter written by Lewis Cass (December, 1847), who suggested that the territories be allowed "to regulate their internal

concerns in their own way." It is exceedingly doubtful if such a doctrine would ever have been proposed or given support if Congress had not been face to face with the problem of the extension of slavery into the territory acquired from Mexico. The North, as a whole, was opposed to the extension of slavery into the territories, while the South was almost unanimous in its favor. Both North and South were inclined to regard the theory of squatter sovereignty as a happy solution, which relieved the states and Congress of a difficult problem.

In the Compromise of 1850 the principle seems to have been recognized, because of the omission of reference to slavery in Utah and New Mexico, and in the Kansas-Nebraska Bill of 1854 it was expressly adopted as a basis. Soon afterwards, however, the doctrine was repudiated by the South, and in the election of 1860 it caused a split in the Democratic party, the Northern wing nominating for President Stephen A. Douglas, who had been for ten years the foremost advocate of popular sovereignty, while the Southern wing, demanding that Congress take vigorous action to defend slavery in the territories, nominated John C. Breckinridge. With the close of the War of Secession and the abolition of slavery, the question lost all political significance (see Political Parties).

The terms *squatter sovereignty* and *popular sovereignty* originally had different meanings, and their confusion in United States history is unfortunate. A *squatter* was a settler who occupied land without having acquired legal title to it, and the old doctrine of "squatter sovereignty," dating from colonial times, gave him legal title after a certain period of years, if the rightful owner did not appear and enter a protest. Many of the early settlers in Kansas, Nebraska and other states west of the Mississippi River were squatters. The remoteness of the land from other settlements, together with the difficulties of determining and acquiring title, gave many an emigrant the chance to pick out and occupy a tract of land that suited him, without taking the trouble to locate the previous owner. Thus popular sovereignty was associated with the squatters of Kansas and Nebraska, and the name *squatter sovereignty* became a synonym in more general use than the correct term, *popular sovereignty*, or sovereignty inhering in the people. W.F.Z.

**SQUID,** *skwid,* a large group of sea mollusks having internal shells and ten movable arms about the mouth. The common squid, which inhabits the coast waters from Maine to South Carolina, is typical of the family. It has a long, pointed body, with two fins at the posterior end, united at the back. Two of its ten arms are longer than the other eight, but all have rows of sucking organs. It has a large head and a mouth equipped with two horny jaws and a rasping tongue. The body of the squid is spotted with several different tints, and it can change its color at will to correspond with its environment. Like others of its family it has an ink bag from which it ejects a dark fluid to discolor the water when fleeing from an enemy. Aided by their sucking disks and movable arms, the squids successfully prey on small fish, and they themselves are eaten by fish, eels, dolphins and sea birds.

The common squid is from eight to twenty inches in length, but there are giant specimens off the Newfoundland coast with bodies from eight to ten feet long and tentacles attaining a reach of forty feet. Sailors tell nearly unbelievable stories of squids having sucking disks as large as dinner plates. These giant sea animals are eaten by whales.

**SQUILL,** *skwil,* the name of several plants with bulbous roots, belonging to the lily family. A species which grows in countries around the Mediterranean produces bulbs sometimes weighing four pounds and of medicinal value. They are collected in August. The outer husk is removed and the bulb is sliced and dried in the sun. The drug made from these bulbs is generally used in the forms of syrup and the tincture of squill. It stimulates the heart and has decidedly irritating qualities, affecting particularly the stomach, intestines and bronchial tracts, and for this reason it cannot be given alone. Squill is sometimes used in chronic bronchitis, but never in the acute disease. Its use is decreasing, because its irritant qualities overbalance the good it may do.

**SQUINTING,** *skwint'ing,* or **STRABISMUS,** *stra biz'mus,* that defect of the eyes which is the affliction of persons said to be *cross-eyed.* Under normal conditions the two eyes can be directed toward an object with the same axis of vision. There are four muscles which make this possible—attached above and below and on each side of the eyeball. Injury to one or more of these muscles causes the affected eye to turn out of its normal position. Sometimes both eyes are affected. That form of squint is most common in which the eye or eyes seem to be looking at the nose. The trouble is remedied by an operation or by fit-

ting glasses to the eyes; sometimes both are necessary. A cross-eyed baby should always be treated by a skilled eye specialist as soon as the trouble arises, for it is no longer necessary to have a child grow up with this unsightly deformity. Because of the great advance made in recent years in the treatment of eye troubles, squint is much less common than formerly. See EYE.

**SQUIRRELS,** *skwur'elz,* a large group of rodents, or gnawing animals, which live in trees or under the ground and are found in woodlands in nearly all parts of the world. Australia is the only continent from which they are absent. Squirrels are graceful, agile animals with long, plumelike tails and somewhat slender bodies. Some are but a few inches in length, and others are as large as a full-grown cat. Their color ranges from black through reddish-brown to gray. The habits of the typical squirrel are suggested in these lines from Mary Howitt's popular poem:

THE SQUIRREL

In the joy of his nature he frisks with a bound
To the topmost twigs, and then to the ground;
Then up again, like a winged thing,
And from tree to tree with a vaulting spring;
Then he sits up aloft, and looks waggish and queer,
As if he would say, "Ay, follow me here!"
And then he grows pettish, and stamps his foot;
And then independently cracks his nut;
And thus he lives the whole summer through.
Without a care or a thought of sorrow.

Squirrels do take thought of the future, however, for they store away nuts to last them through the winter.

**Kinds of Squirrels.** The *red squirrel,* or *chickaree,* ranging from Northern United States to the tree limit in Canada, is the most widely distributed of several American species. The chickaree is an active little creature not over eight inches long, excluding the bushy tail. Its upper parts are chestnut red, the lower parts white, and there is a black stripe along each side. The ears have on the tip a tuft of hairs. It lives almost entirely in trees, seeking a home in a hollow trunk, or making a special nest of leaves and twigs. Its favorite diet of nuts and grain is varied by birds' eggs, young birds, insects, fruits and tender twigs. Red squirrels keep up a shrill, noisy chattering. Their young, three or four to a litter, are born in the spring.

There are a number of species of *gray squirrels* in America. One of the commonest ranges from New England west to Minnesota, and is hunted in the East both for its skin and its flesh. This squirrel is ten inches long. Like the red squirrel, it eats the young and eggs of birds, but is less prone to this bad habit than its smaller brother. One of its means of escaping the notice of its own enemies, particularly the hawk, is to flatten out on the side of a horizontal branch; in this position its gray-coated body is even more inconspicuous than usual. Gray squirrels have a habit of calling to one another by "barking," or uttering a series of sounds that end in a sort of snarl. They are often seen in city parks, where they become so tame that they sometimes climb on the shoulders of passers-by. There are other species of gray squirrels in the southwestern part of the United States and in California.

The *fox squirrels* are larger and handsomer than any of the species mentioned. They are found in the Middle states and in the South. Some are jet black, others reddish-gray, and there are others with colors ranging between these shades. In Europe there is a *common squirrel* which ranges all over the continent. It is colored like the chickaree but is somewhat larger. The squirrels of the tropics are noted for their brilliant coloring, and there is an Oriental species which changes its gray coat for one of bright orange-yellow in the breeding season. This is the only known mammal which has a variation of color corresponding to the changes in the plumage of birds.

There are two other interesting groups of squirrels, those that live in burrows in the ground, and those that fly. The most important *ground squirrel,* the *chipmunk,* is described in these volumes under that title. M.S.

Consult Seton's *Life Histories of Northern Animals;* Hornaday's *The American Natural History.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Chipmunk | Fur and Fur Trade |
| Flying Squirrel | Rodents |

**SQUIRRELTAIL GRASS,** a name frequently applied to WILD BARLEY (which see).

**STA'DIUM,** originally the foot-race course in Olympia, Athens and other places in Greece

where athletic contests were celebrated. It was usually enclosed by terraces having the general shape of a horseshoe, which afforded the spectators a clear view of the field. Occasionally these terraces had seats. The ancient stadium at Athens was recently restored and served as the scene of the Olympian games in 1906. The stadium was also a measure of distance among the Greeks. It was the distance between the terminal pillars of the stadium at Olympia, and was the equivalent of 606 feet 9 inches in English measurement.

In modern times structures similar in type to the Greek stadium have found favor on the athletic fields of universities. Such uncovered buildings, with seats arranged in tiers, have been erected on athletic fields, notably at Harvard, Yale, Princeton and Syracuse universities. The Harvard stadium is a huge structure of reënforced concrete, built in the form of the letter U, and capable of accommodating over 40,000 spectators. The "Yale Bowl," which has a still greater seating capacity, is built in the form of an ellipse, with seats enclosing the field on all sides. Although these modern stadia, like the ancient ones, are designed chiefly for spectators attending various athletic contests, it is not uncommon to utilize them for dramatic performances, especially those which are elaborate and spectacular.

**STADTHOLDER,** *stat'hol der,* the title formerly given to the chief executive of the United Netherlands. The term is variously translated to be the equivalent of chief magistrate, lieutenant, governor, viceroy and delegate. The name was first applied in case of one who was appointed in *stad* or in *stead* of the sovereign—that is, one who represented the ruler as head of a state or province.

After the union of the six states which formed the confederation in 1579, the term *stadthouder,* or *stadtholder,* came to be interpreted as meaning one who holds a city. With this significance it was applied to the office held by William the Silent, Prince of Orange, who was chosen by the people for their ruler. This title was used by his descendants for three generations, and continued to be that of the ruler of Holland until that country was annexed to France in 1802. In 1814 the term ceased to be used, when the title of king of the Netherlands was given to the Prince of Orange.

**STAËL-HOLSTEIN,** *stah'el hohl'stine,* Anne Louise Germaine (1766-1817), generally known as Madame de Staël, a French writer, daughter of Jacques Necker, who was minister of finance to Louis XVI. She was by nature an unusually bright child, and her association with the brilliant people who frequented her father's house increased her interest in matters intellectual and in the affairs of the times. At the wish of her parents she married the Swedish minister, Baron de Staël-Holstein, who was much older than she and with whom she was far from happy. The marriage terminated in a friendly separation, and Madame de Staël continued to live the independent life for which she was fitted.

In 1788 she published her *Letters on Jean Jacques Rousseau,* a very enthusiastic comment, and in various ways showed her approval of the sentiments and events of the early months of the Revolution. Later, however, when she felt that the reformers were becoming extreme, she was active in defense of the royal family, and carried her advocacy so far that she was obliged to flee from the country. She returned in 1794 to Paris, but nine years later was banished by Napoleon, whose suspicions had been aroused. During the years of her exile she lived in Germany, and there became acquainted with the greatest literary men of the time, Goethe, Schiller and Schlegel.

Her works of importance include the novels *Delphine* and *Corinne,* once very popular but now comparatively little read; *Literature in Its Relation to Social Institutions; On Germany,* and *Thoughts on the French Revolution.* More important than any single work was her influence in introducing the romantic movement into France, which up to that time had never freed itself from classic formalism. In this great movement she may be regarded as the foremost figure, and is thus ranked as one of the notable literary personalities of France.

Consult Birch's *Secret Societies and the French Revolution.*

**STAFF,** a military term referring to a body of officers whose duties are connected with a regiment or army as a whole, and not attached to any particular subdivision. In the hands of regimental staff officers is left the arranging of all details concerning the routine, equipment and discipline of the regiment. The staff officers see that the orders of the commanding officer are carried out and that the regiment is always supplied with all things necessary to the efficient performance of its duties.

**The Staff in the United States.** The formation of a *general staff* is modern, and in the United States is based much on the same principles as the general staff of the German army.

The chief of staff is head of all departments of the army and responsible only to the President, who is the constitutional head of the army as a whole. Responsible to the chief of staff are the military secretary, quartermaster-general, inspector-general, the chief of engineers, chief of ordnance, judge-advocate-general, chief signal officer and the chief of the bureau of insular affairs. Thus the head of every department of the service is responsible to the chief of staff, and through him, direct to the President.

The general of the United States army has a personal staff consisting of six officers called aids, ranking as colonels. A lieutenant-general has two aids and a military secretary, ranking as lieutenant colonels; a major-general has three aids, each with the rank of captain or lieutenant.

**European Staffs.** The general staff of the German army, the most efficient organization in any modern army prior to 1915, performs the duties of collecting, adding to and arranging information on military matters and the training of the officers for duty. Divided into sections, the staff concerns itself with plans of operations in case of war with any nation in the world. Campaigns are drawn up; details of the most minute kind are collected concerning the roads, rivers, towns, bridges, villages, railway facilities—in fact, nothing concerning the country under consideration is regarded as too trivial for attention. There are six sections of the German general staff, all working under a director. Their information on all countries is complete, tabular, indexed for ready reference, each section taking charge of information concerning certain countries. What is called the "third section of the general staff" is devoted to collecting information concerning England, France, Italy, Switzerland, Spain, Portugal and the United States, and it is claimed that the maps of these countries obtained by the staff are more correct and detailed than any to be obtained in those countries themselves.

All generals of the German army must have served on the general staff, and a constant exchange of officers from the line to the staff and staff to line is the rule. The German general staff organization is now copied by most European countries and by Japan, which country, after careful consideration, decided that Britain and the United States were to be its models on naval matters, but Germany its guide in military organization. See ARMY. F.ST.A.

Consult Wilkinson's *The Brain of an Army.*

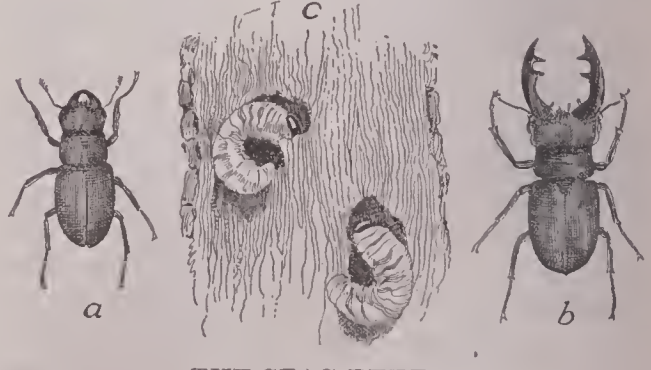
**STAFF,** an inexpensive compound resembling plaster and used instead of stone for temporary buildings, architectural decoration and statuary. It consists chiefly of plaster of Paris and hydraulic cement, mixed in water with dextrin and glycerine. Staff was first used as a covering for buildings in the Paris Exposition in 1878, and it was extensively employed on the buildings of the World's Columbian Exposition at Chicago in 1893, of the Louisiana Purchase Exposition at Saint Louis in 1904, and of the Panama-Pacific expositions at San Francisco and San Diego in 1915.

**STAG,** the male of the red deer, the common deer of Europe. A full-grown stag is a handsome animal, standing about four feet high at the shoulder, and with branching horns three feet in length. Hunters find the pursuit of this noble animal a very thrilling sport, as it is fleet of foot, a skilful swimmer and possessed of keen sight and hearing. The opening canto of Scott's *Lady of the Lake,* which contains a spirited account of a stag hunt, describes a characteristic of the animal in these lines:

> As Chief, who hears his warder call,
> "To arms! the foemen storm the wall,"
> The antlered monarch of the waste
> Sprang from his heathery couch in haste.
> But, ere his fleet career he took,
> The dewdrops from his flanks he shook,
> Like crested leader proud and high,
> Tossed his beamed frontlet to the sky.

The North American wapiti or elk (which see) is closely related to the stag. See, also, DEER.

**STAG BEETLE,** *be't'l,* a family of insects in which the males of certain species have curious hornlike processes on the mandibles. In some cases these horns are nearly as long as




THE STAG BEETLE
(*a*) Female; (*b*) male; (*c*) grubs.

the body of the beetle. The resemblance of these projections to the horns of a stag has given rise to the name of the family. Common American species include the *giant* stag beetle of the Southern states, with mandibles an inch

long and body one and one-half or two inches; and the *pinching bug* of the Eastern states, an insect that flies by night. The adult stag beetles live in trees and feed on sap and on honey dew. The eggs are deposited in crevices of the bark, where they hatch into soft white worms (larvae). See BEETLE.

**STAGHOUND,** a large, white hound with black and tan markings, probably descended from the bloodhound. Its head resembles that of a pointer, but the neck is heavier, the ears more hanging and set lower. There are two strains, the *northern* and *southern.* As the name indicates, these dogs were used for hunting red deer, the male of which is called a stag. Staghounds are almost entirely European dogs, and even there they are rapidly being replaced by the foxhound (which see).

**STAINED GLASS,** in reality is glass stained by chemical process, but the name is also applied to glass which is painted or otherwise colored, particularly such glass as is used in what are known as stained glass windows. In medieval windows of this kind the color was actually incorporated in the glass by a mixing process in the making of the glass itself. This was called "pot metal." Medieval windows were a patchwork of different colored pieces of glass, made into shapes required by the design of the window and put together in much the same way as a colored picture puzzle. The pieces of glass were generally held together by strips of lead soldered together at intervals. The stained glass of medieval days was not made, as it is now, in large panes.

The United States leads the world in the manufacture of stained glass, and the excellence of the product is largely due to the efforts of John La Farge and Tiffany of New York. The processes of manufacture have greatly changed, and it is now easy to obtain effects such as were absolutely impossible with older methods. It was only at the end of the nineteenth century that the art of glass staining assumed commercial importance in America. Previous to that time all stained glass was imported, and but poor imitations of the real art could be obtained. The American artists took up glass staining at the point where the medieval artists ceased to develop it. The wonderful stained glass windows of European cathedrals are priceless chiefly on account of their antiquity. Modern stained glass is superior in effect, coloring and design. So much has the stained glass industry of the United States gained ground that over $3,000,000 is now invested in the art, and there is little importation from foreign countries.

Consult Westlake's *A History of Design in Painted Glass;* Eden's *Ancient Stained and Painted Glass.*

**STALACTITES AND STALAGMITES,** *sta lak' tites, sta lag' mites,* curious and beautiful deposits of limestone which are formed in caves and under stone bridges and arches by the slow trickling of water through cracks and rocks. Stalactites hang from the roofs like icicles, while stalagmites are like inverted icicles, formed by the drip of water on the floor. Sometimes they grow to meet each other and form columns, or take curious and fantastic shapes. Great caves festooned with stalactites, similar to the wonderful ice caves of the Polar regions, are found at Adelsberg in Styria, Austria, at Jenolan in Australia, in Kentucky (Mammoth Cave) and in Belgium. In the lava caves of many of the East Indian Islands glistening black stalactites of basalt hang from the roofs. See MAMMOTH CAVE.

**STAM'FORD,** CONN., a city in Fairfield County, in the southwest corner of the state, on Long Island Sound and on the New York, New Haven & Hartford Railroad. It is thirty-four miles northeast of New York City and seventy-five miles southwest of Hartford. The population, which was 25,138 in 1910, had increased to 35,119 in 1916 (Federal estimate). The area is seven and a half square miles. Stamford was settled in 1641, and for two hundred years was principally an agricultural community. It was incorporated in 1893, and is an attractive residential city with several important manufacturing establishments. Features of special note are the town hall, state armory, Federal building, Y. M. C. A. building, Ferguson Library (a beautiful example of colonial architecture), Stamford Hospital and churches. Along the Sound is Halloween Park (eighty-eight acres), and throughout the city are a number of small parks and playgrounds. The city has several excellent private schools. Stamford is noted as the city in which Yale locks are manufactured. Other important manufactures are stoves and ranges, submarine cables, tanning extracts, pianos and paints.

**STAMMERING,** *stam' er ing,* a defect of speech resulting from imperfect action of the muscles used in articulation. There are several varieties of stammering. A common form, also known as *stuttering,* is the affliction of those who repeat several times the first syllable of certain words, especially those beginning

with *b*, *p*, *t* and *d*. In other cases certain sounds are slurred or omitted altogether, or one sound is used in place of another. Some persons are afflicted with a silent form of stammering, in which speech fails them entirely. The trouble is frequently caused by nervousness, and is often associated with Saint Vitus's dance (which see). It may be inherited, and statistics show that it is much more common in males than in females. If proper treatment is not applied, a person who begins to stammer in early childhood may continue to do so all his life.

Modern authorities believe that one of the best means of treating the disorder is teaching breath control. Cures have been effected by the use of singing lessons, as rhythm has been found an aid in teaching correct breathing and enunciation. Such conditions as eyestrain, diseased tonsils, nasal catarrh and the like are often predisposing causes, and should receive the attention of a reliable physician.

By exercising patience and persistence, a mother can often cure her child of stammering if the case is not too serious. Scolding or ridicule will never accomplish the slightest good result. The child should be directed to breathe slowly and deeply and to repeat carefully the syllables that give him trouble in articulation.

See EDUCATION, subtitle *Hygiene of Education.* C.B.B.

Consult Scripture's *Stuttering and Lisping.*

**STAMP,** an adhesive paper bearing an impression or device authorized by law and adopted for attachment to some subject of duty or excise; also, an impression on paper made by order of government, to be used for the purpose of raising revenue. The presence of such a paper or impression on a document of any kind is evidence that the laws respecting it have been complied with.

Stamp duties were first imposed by the Dutch in 1624. In England the plan was first resorted to in 1694, to raise money for carrying on a war with France. The subject of stamp duties is of great historical interest to the United States, as it was the passing of the Stamp Act of 1765 by the English Parliament that led directly to the Revolutionary War.

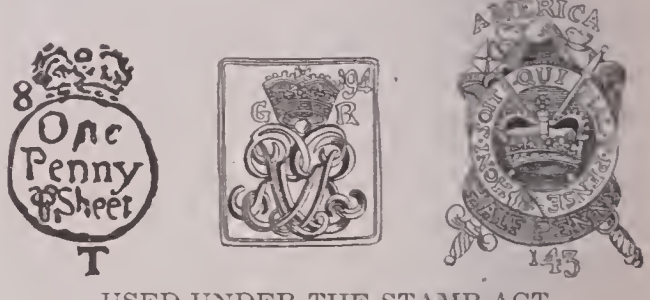
In 1862 the Congress of the United States passed a law requiring that stamps, especially prepared for the purpose, should be affixed to legal papers and documents, and to packages of many different kinds of merchandise. This was done to raise funds to pay in part the expenses of the War of Secession, and the law was repealed when the necessity was removed. Again, in 1898, a similar law was passed, on account of the war with Spain. These stamps, called internal revenue stamps, are now required on tobacco, cigarettes, liquors, etc., and on such articles as oleomargarine, filled cheese, opium, mixed flour, and the like.

The form of stamp with which peoples of all countries are most familiar is the postage stamp; it is fully described in these volumes.

**Related Subjects.** The reader is referred to the following articles in these volumes:

Internal Revenue
Postage and Postage Stamps
Stamp Act
Tax and Taxes

**STAMP ACT.** The growing prosperity of the colonies in America and the increasing debt of the mother country induced the British ministers in 1764 to attempt to raise revenue in America to meet home expenses, and partially




USED UNDER THE STAMP ACT
Three of the stamps of the British government imposed on the American colonies.

to make the colonies self-sustaining. In March, 1765, the Stamp Act was passed, imposing a stamp duty on all commercial papers, legal documents and newspapers. Although the colonies had signified their willingness to raise money to assist in paying the debt incurred by England in the French and Indian Wars, they denied that Parliament had the right, arbitrarily, to impose a tax upon them, since they were not represented in that body. Therefore the publication of the act "operated in America like a spark dropped on a tinder," although the cost of each stamp was trifling.

By acts of violence the stamp distributor, admiralty deputy and lieutenant-governor in Massachusetts were forced to resign. Patrick Henry denounced the British government and influenced the Virginia assembly to pass resolutions against taxation by Parliament, and at the request of Massachusetts, a congress in which nine of the colonies were represented, the first colonial congress in America, met at New York and drew up a statement of the position of the colonies. This was called the Stamp Act

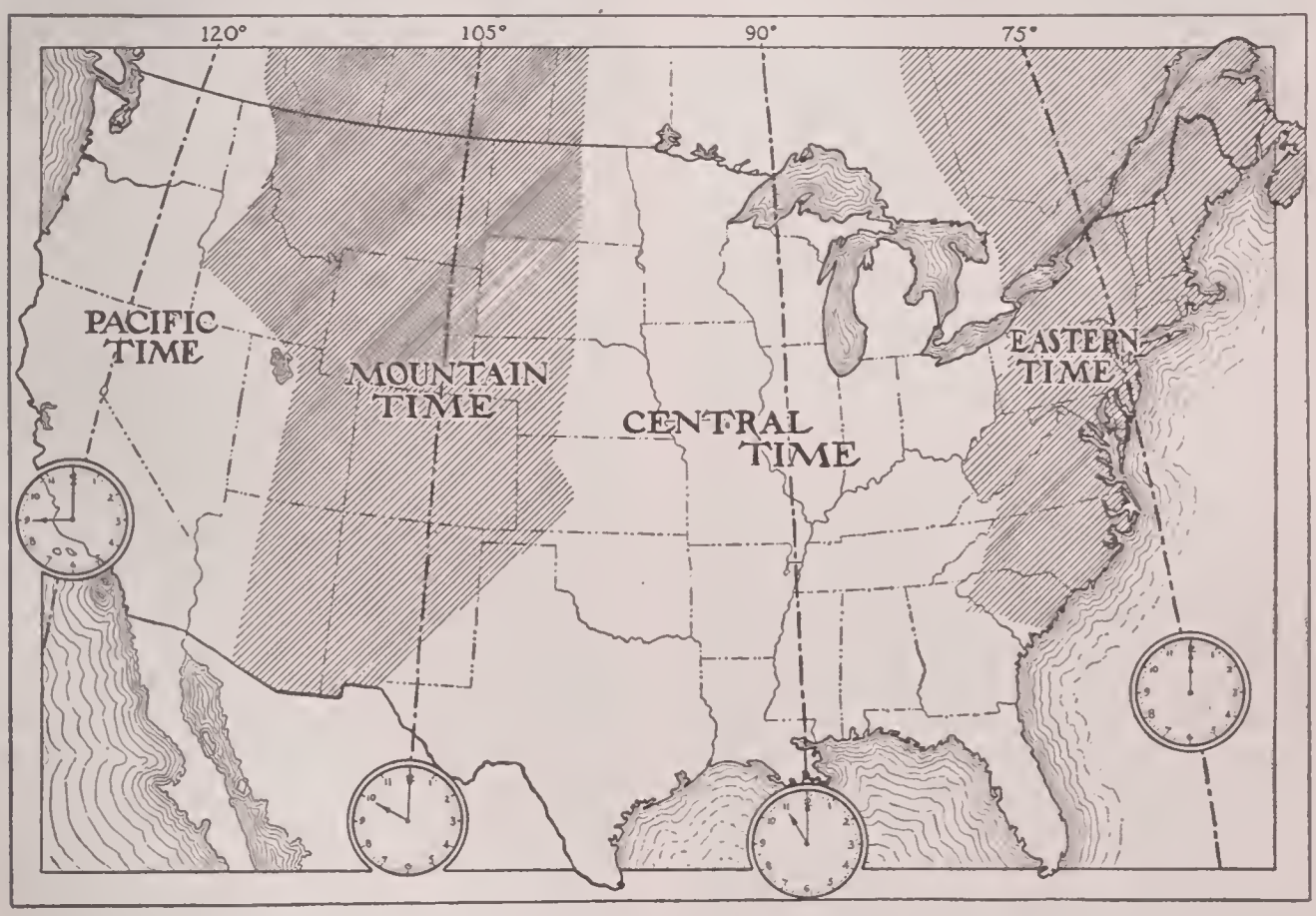
Congress. Though the act was repealed in March, 1766, the right to tax the colonies was reiterated. The repeal of the Stamp Act only led to another and heavier tax which resulted in open defiance on the part of the colonies, the closing of the port of Boston by England and the ultimate break between the colonies and the mother country. See REVOLUTIONARY WAR IN AMERICA.

Consult Howard's *Preliminaries of the Revolution.*

**STANDARD OIL COMPANY.** Until a decree given in 1911 by the Supreme Court of the United States was put into effect, there existed in America a powerful petroleum "trust," consisting of nearly seventy oil companies controlled by the Standard Oil Company of New Jersey. In obedience to the court's order the New Jersey company distributed among its stockholders its holding in thirty-three companies, including the Standard Oil companies of six other states; nominally, at least, there is no longer an oil "combine" in the United States. But the old holding company still controls the Imperial Oil Company, Ltd. (which has almost a monopoly of the Canadian petroleum trade) and a number of foreign companies, among them a powerful German company.

The Standard Oil combination, perhaps the most powerful industrial organization that has ever existed, was a monument to John D. Rockefeller and his associates. Mr. Rockefeller built his first petroleum refinery in Cleveland in 1862, three years after the world's first oil well was bored. By thorough efficiency and by securing rate favors from the railroads he became the undisputed leader in the industry. In 1872 he organized a secret combination of the larger refineries, and ten years later incorporated the Standard Oil Company of New Jersey.

Consult Montague's *The Rise and Fall of the Standard Oil Company;* Tarbell's *History of the Standard Oil Company.*




THE ZONES OF STANDARD TIME

**STANDARD TIME,** the system by which time is now measured in the daily affairs of life. When the sun is on the meridian of any particular place, the time at that place is noon. This is true *solar time,* or *sun time.* As the earth turns on its axis from west to east, the sun appears to travel from east to west, and the point at which the sun is on the meridian is likewise moving from east to west. Thus, the sun is on the meridian at Cincinnati about an hour later than at New York; in other words, when it is noon by sun time in New York, it is only 11:00 o'clock in Cincinnati. At all places east of New York it is afternoon.

because the sun has already passed them. It is clear that every fraction of a degree of longitude has a different true noon.

A system of standard time was advocated to remedy the confusion which arose from the difference in local sun time. The old system of using sun, or local, time was especially annoying to travelers, for each railroad and city had its own time. The result was that several railroads meeting in a town might all use different time systems; a traveler arriving at a terminus at 11:00 o'clock might wish to take another train at 10:30 and, because of differing time standards might have to wait some time for his outgoing train, or he might find his train already gone.

The need of a standard for all parts of the world led to the Prime Meridian Conference at Washington, D. C., in 1882. As a result of this conference the railroads of the United States and Canada adopted in 1883 the system of standard time. The railroads having adopted a uniform system, it was not long before the use of standard time was general in all lines of enterprise. In some rural communities the change was slow, but once adopted it has always been retained because of its simplicity and convenience.

Under the system of standard time, the continent is divided into parallel zones, each of which takes the sun time of practically its central meridian. These central meridians differ from Greenwich longitude by exact multiples of 15°, this being the distance traveled by the sun in one hour. Thus, the standard time meridians in North America are 60°, 75°, 90°, 105° and 120° W. Each zone extends 7° 30′ east and the same distance west of the standard meridian. For practical purposes, the limits of the time zones are not rigid; for example, if a town lies on both sides of a meridian, the same time is kept in all parts of the town, and particularly in the western part of the United States the boundaries of zones are uneven, that terminal points of great railroad systems may have the same time as their eastward-stretching divisions.

The time of the 60th meridian is called *Atlantic,* or *Colonial* time; that of the 75th is *Eastern;* of the 90th, *Central;* of the 105th, *Mountain,* and of the 120th, *Pacific.* These are respectively four, five, six, seven and eight hours earlier than Greenwich time. W.F.Z.

Consult Allen's *Short History of Standard Time.*

**STANDISH,** Miles, or Myles (1584-1656), an American colonist, born in Lancashire, England. What little education he possessed was received in that shire, but most of his youth was spent in the British army. Before 1603 he had been appointed lieutenant, for bravery, in the wars in Holland, and in 1609 he joined

THE STANDISH GRAVE
At Duxbury, Massachusetts.

the Puritan colony in that country. He was not, however, a member of the church of the Puritans, but simply their assistant in colonization plans and in training their militia. He was one of the passengers on the *Mayflower,* and immediately after its landing at Plymouth, Mass., was chosen military captain of the colony.

His soldiers were few, but he made such a brave show with them on several occasions that the Indians greatly feared him. In 1622, when the savages planned the destruction of both Weymouth and Plymouth, Standish with only eight men attacked their camp, killed their two chiefs and put the assembled tribes to flight. He had unusual business ability, and as assistant to the governor and treasurer of the colony secured reductions in British claims that saved the colonists thousands of dollars. *The Courtship of Miles Standish,* by Longfellow, who was a descendant of John Alden and Priscilla Mullins, was not intended to be accurate in every detail, but the main points of the courtship as given in the poem are correct.

**Related Subjects.** The article Mayflower includes a list of names of the *Mayflower's* passengers, in the exact language and spelling of Governor Bradford. See, also:

| | |
|---|---|
| Alden, John | Pilgrims |
| Bradford, William | Plymouth Rock |
| Massachusetts Bay Colony | Puritans |

**STANFORD,** Leland (1824-1893), an American capitalist and philanthropist, who assisted greatly in building the great West, was born at Watervliet, N. Y. After a brief school course

and some study of law in his home town, he went to Port Washington, Wis., in 1849, and there practiced law for three years. He was not very successful, so he moved to California to try gold mining. In this he made considerable money, but the real basis of his fortune of $50,000,000 was a mercantile business which he established at San Francisco in 1856. In 1860 he entered politics as a delegate to the convention that nominated Lincoln, and in 1861 was elected governor of California. In the latter year he was chosen president of the Central Pacific Railway, then under construction, and did such successful lobbying at Washington that Congress granted large government aid for the road. Stanford was then requested by the directors to take personal charge of the building of that part of the line crossing the Sierra Nevada Mountains, and he established the remarkable record of laying 530 miles of mountain road in 293 days.

**Founded a Great University.** From 1885 to 1891 he was United States Senator from California, but after 1885 the chief interest of his life was in Leland Stanford Junior University, at Palo Alto, Cal., a memorial to his son, who died in Rome, Italy, at the age of sixteen. The father and mother, almost crushed by this loss, determined to found an institution of such rank that the boy's name should never be forgotten. Accordingly, in November, 1885, Stanford donated $20,000,000 for this purpose, and each year added gifts of lands, buildings and securities. After his death, Mrs. Stanford presented further securities amounting to $18,000,000, her residence, valued at $400,000, and 1,000,000 acres of land, valued at $12,000,000.

The university erected to the memory of their boy is therefore the richest in the world, as well as one of the highest in scholarship. Leland Stanford died at Palo Alto, where in later years his widow erected one of the most beautiful of American churches to his memory.

**STANLEY,** Frederick Arthur, Earl of Derby. See Derby, Frederick Arthur Stanley.

**STANLEY,** Sir Henry Morton (1841-1904), whose baptismal name was John Rowlands, was one of the greatest of the world's explorers, famous for his discoveries in Africa. He was born at Denbigh, Wales. His youth was one of hardships, for his father died when Stanley was but two years old, and his relatives were too poor to care for him. In 1857, after spending ten years in a workhouse, he sailed as cabin boy on a vessel to New Orleans. Here he attracted the favorable notice of a merchant named Stanley, who adopted him and gave him his name, but who died without making provision for him.

At the outbreak of the War of Secession young Stanley joined the Confederate army, fought at Shiloh, and was there taken prisoner. In 1863, after a visit to Wales, he entered the United States navy, becoming ensign on the *Ticonderoga*. Gradually he took up newspaper work, and his pluck and determination made him particularly valuable as a correspondent in difficult and dangerous situations. After representing the New York *Herald* in Abyssinia and in Spain, he was commissioned by that paper in 1869 to "go and find Livingstone." He spent a year in Egypt, Constantinople, the Crimea, Palestine and Persia, on various missions for the *Herald,* and then embarked for Africa, in October, 1870. See Livingstone, David.

HENRY M. STANLEY
He opened the "Dark Continent" to the knowledge of man and to the territorial schemes of the nations of Europe.

**His African Service.** Starting from Zanzibar in February, 1871, Stanley pushed on to Ujiji, on Lake Tanganyika, where he found Livingstone. His first speech when he saw the veteran explorer was characteristic: "Dr. Livingstone, I presume?" At Ujiji he remained for four months, and as the older explorer refused to accompany him back to civilization he left supplies and returned to Europe in 1872.

Two years later, after the death of Livingstone, Stanley returned to Africa to carry on explorations beyond the point which Livingstone had reached. He set out from Zanzibar in November, 1874, with three white men and over three hundred natives, and pushed on into the interior. He sailed about Victoria Nyanza, proving it to be a great lake and not a succession of lagoons, discovered Lake Albert Edward, and in 1876 began what was at once the most perilous and the most important part of his enterprise. This was a journey down the Congo, from its source to its mouth. All of his white companions and half of his native carriers had died before he emerged on the At-

lantic coast in August, 1877, but the course of the great waterway into the heart of Africa had been made clear.

A direct result of this exploration of the Congo was the founding of the Congo Free State, in the interests of which Stanley spent in Africa the years from 1879 to 1884. Stations were founded, treaties were made with the natives, and much additional geographic information was collected. In 1886 he visited the Egyptian Sudan, his object being the relief of Emin Pasha, and on this expedition he again crossed the continent from coast to coast, passing, as he said, through "miles and miles, endless miles, of forest." This was his last trip to Africa, but he had proved himself one of the greatest and most successful of explorers and had contributed more to the knowledge of the "Dark Continent" than any other man, with the exception of Livingstone.

**Career in England.** Stanley had been through all his years of active work a citizen of the United States, but in 1892 he was renaturalized as a citizen of Great Britain. At the wish of his wife, Dorothy Tennant, whom he had married in 1890, he stood for Parliament, to which he was elected in 1895, as member from North Lambeth. Many honors were conferred upon him, and his books attained a wide popularity. These, which include *How I Found Livingstone; My Kalulu; Through the Dark Continent; In Darkest Africa,* and *My Dark Companions,* have a charm and a dramatic force which are rare in books of travel.

Stanley's great success was due primarily to his inflexible will, which took no account of apparently insuperable difficulties, and to his natural ability to deal with savage peoples. He was always truthful and kind in his dealings with the natives, but did not hesitate to force them to do his will if gentler measures failed and their aid was absolutely essential. A.MC C.

Besides the books by himself referred to above, consult *The Autobiography of Sir Henry Morton Stanley,* prepared by his wife; Rowland's *Henry M. Stanley: The Story of His Life.*

**STANOVOI,** *stah no voi',* **MOUNTAINS,** a range of mountains in Siberia, running from the Mongolian frontier in a northeasterly direction, terminating at East Cape, on Bering Strait. An offshoot extends in a southerly direction through the peninsula of Kamchatka. The entire length of the range is about 3,000 miles, and the system is more in the nature of a rugged, elevated plateau than a chain of mountains. The greatest height is attained in Mount Tehokhondo, a little over 8,000 feet above sea level. The drainage from its slopes feeds numerous rivers, the most important of which are the Lena, Amur and Yenisei. In the extreme northeast the Stanovoi range forms the dividing line between the Pacific and Atlantic oceans.

The Stanovoi can hardly be regarded as a separate mountain system, being in reality a continuation of the Yablonoi range, which is similar in formation and appearance. As far north as the parallel of 60° the lower slopes are densely forested, but further north they become bare and desolate. The whole range is rich in minerals, but it is practically undeveloped, such mining as has been carried on being done by convicts and exiles banished from Russia, under government control, until 1917, when the revolution freed the exiles and gave them courage to promote private mining enterprises.

**STANTON,** Edwin McMasters (1814-1869), an American statesman, who became the famous Secretary of War in President Lincoln's Cabinet. He was born in Steubenville, Ohio. After two years of study at Kenyon College, he studied law and was admitted to the bar in 1836. In 1856 he moved to Washington, D. C., where he had considerable practice before the United States Supreme Court. He succeeded Jeremiah Black as Attorney-General in 1860. Always outspoken, Stanton made no concealment of his violent opposition to slavery, and Lincoln confidently made him Secretary of War, although he and Stanton were hardly friends. Stanton showed a genius for administration and for sure, rapid judgments, which made his conduct of his office extremely efficient. To him, almost as much as to Lincoln, and surely as much as to any general in the war, the successful outcome of the struggle may be attributed.

EDWIN M. STANTON
The only President of the United States who was ever impeached suffered that indignity because of a quarrel with Stanton.

Stanton's blunt statements, his tactlessness and his pitiless judgments made many enemies. Lincoln overlooked his faults, but after Johnson became President the two clashed in-

cessantly over reconstruction issues (see RECONSTRUCTION). It was because Johnson tried to remove his Secretary from office that the former was impeached. After the President's acquittal, Stanton resigned. President Grant appointed him Associate Justice of the Supreme Court, but a few days after the appointment Stanton died, worn out from overwork, an old man at fifty-five. The struggle between Stanton and the President is described more fully in these volumes in the biography of Andrew Johnson (see page 3162).

Consult Flower's *Edwin McMasters Stanton;* DeWitt's *The Impeachment and Trial of Andrew Johnson.*

**STANTON,** ELIZABETH CADY (1815-1902), an American reformer, a pioneer in the cause of woman suffrage, was born at Johnstown, N. Y. She was graduated from Emma Willard Seminary, in Troy, N. Y., and in 1840 was married to Henry B. Stanton, a man prominent in the antislavery agitation. While visiting in London she met Lucretia Mott, and it was largely through her influence that Mrs. Stanton decided to call a woman's rights convention at her home in Seneca Falls in 1848. This began her active public career, during the course of which she constantly championed equal rights for the two sexes; that is, more specifically, more intelligent divorce laws, equal rights of property and of suffrage and equal educational advantages. In 1861 she was made president of the Woman's Loyal League, and was also the first president of the National Woman's Suffrage Association, serving in that capacity from 1865 to 1893.

ELIZABETH CADY STANTON

Mrs. Stanton's lecture tours included the United States, Canada, England, France and Scotland. In 1888 she presided over the first International Council of Women held in Washington. She was the founder, and for a time the editor, of *The Revolution,* a reform periodical. A prominent feature of her life was the attention she gave to the duties of her own home, and her skill in avoiding any conflict of public work with domestic life. Many of the reforms she agitated are still unachieved, but during her lifetime she witnessed great improvement in the status of women, principally in educational lines, in matters relating to woman's legal possession of personal property, and in the struggle for equal suffrage. Her writings embrace her autobiography, entitled *Eighty Years and More,* and *A History of Woman Suffrage,* of which she was joint author with Susan B. Anthony and Mathilda Joslyn Gage.

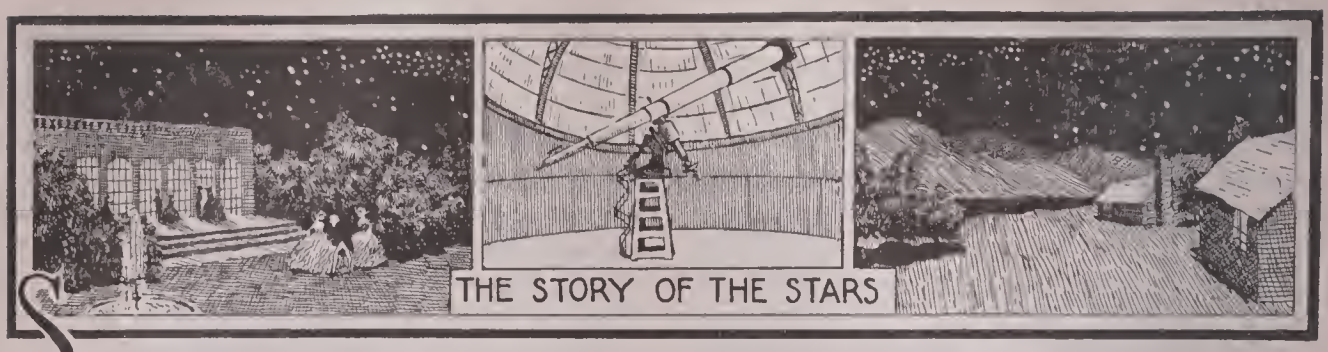
In the group of social and political reformers of the period of Mrs. Stanton's activity were such devoted women as SUSAN B. ANTHONY, MARY A. LIVERMORE, BELVA LOCKWOOD, LUCRETIA MOTT, DR. ANNA SHAW and FRANCES WILLARD. These will be found in their alphabetical order. See, also, WOMAN SUFFRAGE.

**STANTON,** FRANK LEBBY (1857- ), a journalist and poet whose negro songs and verse of the Southern United States have been very popular. From his early youth, Stanton has been in the field of journalism. He was born in Charleston, S. C., and after receiving a common school education served an apprenticeship as a printer, at one time in the employment of Joel Chandler Harris, one of the South's most delightful writers, as an office boy.

Stanton early became associated with the press of Atlanta, Georgia, and is one of those poet humorists who edit a column of wit and satire on topics of present interest; his column in *The Atlanta Constitution* he called "News from Billville." Stanton is the author of several volumes of poetry which for its charm, simplicity and optimism is unique. If measured by the opinion of newspapers and critics, the writings of few recent American poets have been more popular, both in the United States and Canada. Among the volumes of Stanton's verse are *Songs of the Soil, Songs from Dixie, Up from Georgia* and *Little Folks Down South.* His *One Country,* an outburst of patriotism, begins as follows:

After all,
One country, brethren! We must rise or fall
With the Supreme Republic. We must be
The makers of her immortality—
Her freedom, fame,
Her glory or her shame:
Liegemen to God and fathers of the free!

After all—
Hark! from the heights the clear strong clarion call
And the command imperious: "Stand forth,
Sons of the South and brothers of the North!
Stand forth and be
As one on soil and sea—
Your country's honor more than empire's worth."




STAR, a heavenly body which appears to us as a spot of twinkling light, quaintly described by a child as "a hole in the sky." So far as known, it is of the same composition as the sun, which is itself a star.

Stars are bodies which, like our sun, are incandescent, each shining with its own light. The stars that can be seen with the naked eye number between 6,000 and 7,000, but the number actually visible at one time is rarely more than about 2,000. A powerful telescope soon shows that those which can be seen with the eye are only a small proportion of the number really existing. A telescope like the great equatorial at Yerkes Observatory would show more than 100,000,000, while even an opera glass of average quality would make visible about 100,000. Photography has recently revealed many millions of stars never before detected. From the earth all stars look more or less alike to the eye, varying principally in size and brightness. Young, an American astronomer, says, however, that stars differ among themselves in size, color and brilliancy, "as much as flies differ from elephants;" the Bible, too, uses as a comparison, "as one star differeth from another in glory."

**Grouping and Naming of Stars.** Stars appear to be naturally grouped in constellations, which are given names mostly drawn from Greek mythology. Sometimes the grouping of the stars suggests the name given; at other times the name does not appear appropriate or to have been bestowed for any particular reason. The stars themselves are being given special names as rapidly as astronomers can catalog them. Usually a star's name is that of the constellation in which it appears plus a Greek letter; thus *Alpha Centauri* is the first in *Centaurus*. The subject of grouping and naming is treated fully in the article ASTRONOMY, subhead *The Stars and Their Names*.

**Variable Stars.** Stars which appear to change their brightness, either slowly, regularly, or continually, are called variable. They may blaze out suddenly and disappear, grow bright and dull alternately, or slowly fade. Many explanations have been suggested concerning the causes of these changes. "When the stars grow old," is not as fanciful an expression as it might seem; the changes, when merely progressive, are due to age, while the periodical darkening of stars is attributed to an eclipse by some intervening opaque body.

**Size of Stars.** The measurement of stars is in many cases almost impossible. The apparently tiny spots yield practically no basis for calculation. It has been carefully estimated, however, by use of the spectroscope, that Algol, a bright star in the constellation of Perseus, has a diameter of 1,160,000 miles, or about 140 times the diameter of the earth. Algol has a companion star, invisible to all but the most powerful instrument, with a diameter of nearly 1,000,000 miles. The diameter of the sun is 108 times that of the earth, yet Arcturus has a diameter 100 times greater than that of the sun.

**Magnitude.** In respect to the degrees of brightness with which they shine, stars are divided into *magnitudes*. The human eye cannot discern stars beyond the sixth magnitude, and the largest telescopes do not reveal any lower than the fifteenth. Stars of the first magnitude shine about one hundred times as brightly as those of the sixth, and their light is perhaps a million times as intense as those of the fifteenth. From the days of the Greek astronomer Hipparchus, in the second century B. C., catalogs of stars have been compiled from time to time. The following table is a recent one, but, as estimates are being constantly revised, it must be considered subject to change:

| | |
|---|---|
| Stars of first magnitude | 20 |
| " " second " | 65 |
| " " third " | 190 |
| " " fourth " | 425 |
| " " fifth " | 1,100 |
| " " sixth " | 3,200 |
| " " seventh " | 13,000 |
| " " eighth " | 40,000 |
| " " ninth " | 120,000 |
| " " tenth " | 380,000 |
| " " eleventh " | 1,000,000 |

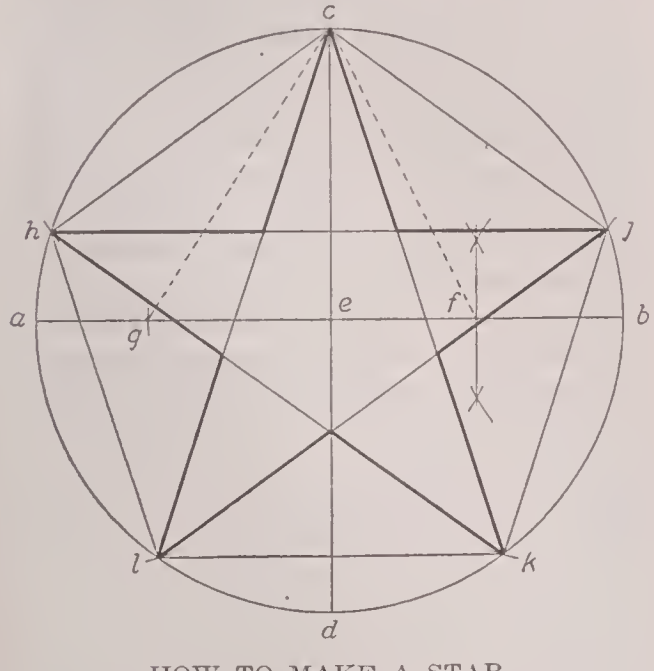
| | | |
|---|---|---|
| Stars of twelfth magnitude | ..... | 3,000,000 |
| " " thirteenth " | ..... | 9,000,000 |
| " " fourteenth " | ..... | 27,000,000 |
| " " fifteenth " | ..... | 80,000,000 |

Among the stars of first magnitude are Sirius, Canopus, Rigel and Aldebaran.

**Mariner's Stars.** "Steering by the stars" has become a common expression, and sailors by careful observation of the position of certain well-known stars are able to verify the correctness of or error in the courses they are steering. In the northern hemisphere the familiar Dipper acts as guide to mariners and to hunters in the forests of the North. Two of its stars point to the North Star; that point ascertained, the other points of the compass are easily located. In the southern hemisphere the Southern Cross serves the same purpose. Many a sailor, storm tossed, his vessel driven miles out of its course, has been cheered and saved by a rift in the clouds which permits him a view of the Dipper or of the Southern Cross.

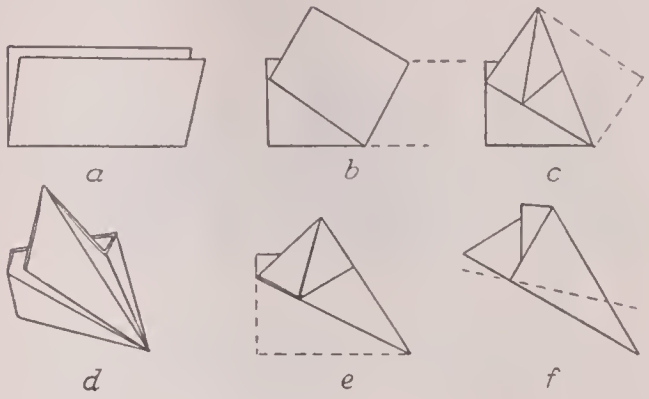
**How to Make a Star.** The accompanying diagram shows a geometrical drawing which may serve as a pattern for a five-pointed star. The drawing can be constructed as follows:

Draw a four-inch circle. Draw the horizontal and vertical diameters *a b* and *c d*. Mark the point of intersection *e*. Bisect *e b* and




HOW TO MAKE A STAR
The figure is explained in the text.

mark the point of intersection *f*. With *c* as a center and *c f* as a radius, transcribe an arc cutting *a c*, marking the point of intersection *g*. With *g c* as a radius and *c* as a center, describe two arcs cutting the circumference at *h* and *j*. With *h* and *j* as centers and the same radius, describe arcs cutting the circumference at *k* and *l*. Form a star by connecting *c* and *l*, *c* and *k*, *h* and *k*, *l* and *j* and *h* and *j*.




HOW A STAR MAY BE CUT FROM PAPER
Explanation appears in the text.

The six drawings of the second diagram show how a star may be cut out quickly by folding. Cut on the dotted line in *f*, which shows the reverse of *c*.

These directions will be especially helpful to a class desiring to make a flag (see subhead *How to Make a Flag* in FLAG article, page 2196).

Consult Young's *Lessons in Astronomy;* Newcomb's *The Stars: A Study of the Universe;* Chambers' *Story of the Stars.*

**Related Subjects.** In addition to above references see list of related subjects at the close of the article ASTRONOMY.

**STARCH,** a soft, white, glistening powder, originating within the living cells of plants. Starch is made up of hydrogen, carbon and oxygen, and is therefore a carbohydrate. It is one of the most important foods known to man, and is an active producer of energy and heat in the body, through which it circulates in the form of grape sugar, a chemical change resulting from digestion. It is highly nutritious, if taken in combination with other foods.

**The Plant as a Manufacturer of Starch.** Starch making is confined to those plants which contain a green coloring matter called chlorophyll, and takes place only under the direct influence of sunlight and when water and carbon dioxide are both present. Just how the chlorophyll bodies use the water and carbon dioxide to make starch is not known, for the process is understood by neither the chemist nor the botanist. Professor George L. Goodale of Harvard University has made the following interesting comparison of the starch-making leaf to any mill—for ease of comparison, a flour mill:

| | The Mill | Leaf Cells |
|---|---|---|
| Raw Material: | Wheat | Carbon dioxide, water |
| Energy: | Steam, electrical or water power | Sunlight |
| Manufactured product: | Flour | Starch |
| By-product: | Bran, etc. | Oxygen |

The reserve starch made by the leaves and other green parts of the plant is changed to some other form and carried to the storage region of the plant to be reconverted into starch. The underground stems and roots, and the stems, pith and seeds of various plants are important reservoirs for storing starch; it is also found in pulpy fruits and in the juice of most vegetables. It is especially abundant in wheat, potatoes, and in such starchy foods as arrowroot and sago.

**Characteristics.** Under the microscope starch is seen to consist of minute, oval or pear-shaped grains, each of which contains a central portion, or nucleus, and a series of envelopes, arranged about the nucleus and having a common center. The size of the grains and the arrangement of layers vary in different plants, which enables one to determine the source of any particular starch. Starch will not dissolve in water, alcohol or ether, but in boiling water the grains swell and break up, forming a stiff paste, when cooled.

An infallible test for starch is the addition of tincture of iodine to the starch paste, which produces a deep blue color. This color disappears if heat is applied. The iodine test is useful in determining the presence of starch in foodstuffs. If starch is heated dry it will change to a yellowish substance called dextrin. Dextrin subjected to heat and an acid or ferment is converted into dextrose, or grape sugar, which is contained in ripe fruit, honey and sweet wine. The starch in bread dough is by fermentation converted into dextrose, which is further changed into alcohol.

**How Starch Is Prepared for Use.** Starches are divided into two general groups—those used for food and those used in laundering, in the finishing of certain textiles and as a thickening material in calico printing. Some starches come under both groups. Starch is also used indirectly in the preparation of dextrin and starch sugar, potato starch being the principal variety employed for this purpose. The chief food starches are arrowroot, sago and tapioca; the preparation of these is described under their respective titles.

Cornstarch, widely known and used, is the starch of Indian corn, or maize. The starch is first separated from the grain by steeping for a long time in water; it is then crushed between cylinders and strained through a sieve. The milky fluid containing the starch grains is allowed to flow over a series of surfaces having a slight inclination, and in this process the heavier grains are deposited; while the lighter particles are carried into settling tanks. The deposit in the tanks is purified by a series of straining and settlings, the final product being dried by artificial heat until it forms the fine white flour sold as cornstarch.

Wheat, rice and potatoes are extensively used in making starches for industrial purposes, rice starch being preferred for use in the laundry. Wheat starch is separated from the grain by two methods—fermentation and a mechanical process. In the former process whole wheat or wheaten meal is soaked in water for the purpose of softening the wheat grains and causing them to swell. The grains are then reduced to a pulp, and a thick fluid is formed by mixing the pulp with water. The mixture is then placed in tanks and subjected to fermentation, after which the starch is separated in a washing drum, and purified by repeated washing and settling, being finally dried by gentle heat.

By the mechanical process a stiff paste is made by kneading wheaten flour. This is washed over a fine sieve, in the course of which the starch is separated from the gluten, the latter remaining in the sieve as an elastic, sticky mass. The starch is then purified and dried. The gluten mass is utilized in various ways, notably as a food for patients suffering with diabetes and as an ingredient of macaroni.

Potato starch is made by steeping and washing the potatoes, and then rasping them down to a fine pulp, which is deposited in water in the form of raw starch. The starch is washed over fine sieves so the impurities and pure starch may be separated; only the latter passes through the meshes of the sieve. Potato starch is widely used as an adulterant and as a substitute for the pure food starches.

**Production.** Starch products valued at about $16,000,000 are made annually in the United States. Illinois is the leading state in value of output, being followed in order by Iowa, New Jersey and Indiana. The town of Argo, Ill., a suburb of Chicago, was founded in 1905 for the sole purpose of starch making. It is the world's largest center for this industry. The second

largest center is at Oswego, N. Y., although as a state New York ranks fifth. B.M.W.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Carbohydrates | Digestion |
| Chlorophyll | Yeast |

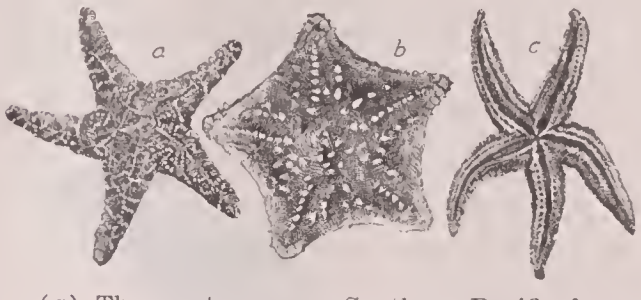
**STAR CHAMBER,** an English tribunal which met at Westminster and which is said to have taken its name from a room where the meetings were held, which was decorated with gilt stars. It is supposed to have originated in the ancient exercise of judicial functions by the king's council. Until the fifteenth century little is known of it, but in 1488 Henry VII reorganized it and gave it new powers, or, according to another theory, inaugurated a totally new court. His statute gave to a commission composed of a chancellor, treasurer, keeper of the privy seal, chief justices, or in their absence, to other justices, a bishop and a temporal lord, the right to act as a court of trial for all misdemeanors of sheriffs or of jurors and for all riots or unlawful assemblies. The trials were without jury, and any sentences short of death might be passed.

During the time of the Tudors this court, arbitrary as it was, was of real service in reducing to order the great nobles, who when brought before any ordinary court often succeeded in intimidating the jury. Many abuses crept into its proceedings in the course of time, however, chief among them the custom of forcing prisoners by torture to confess. Under James I and Charles I the hatred felt against the Star Chamber greatly increased, and in 1641 the Long Parliament abolished it.

The term *star chamber* is used to-day to designate secret meetings of officials or politicians in which plans are laid for their personal aggrandizement rather than for the public good.

**STAR'FISH,** a family of interesting sea animals having the general appearance of a five-pointed star. The "points" are five arms which radiate from a central disk. Starfish belong to the same branch of the animal kingdom as sea urchins and sea lilies, the *echinoderms* (which see). This word means *spiny-skinned,* and refers to the prickly covering of these animals. The tough, leathery skin of the starfish is beset with limy spines arising from plates developed just under the skin. On the under surface of the disk is a mouth, and on the same surface of each arm there is a groove beginning at the mouth and ending near the tip of the arm. Along the grooves are double rows of tubelike "feet," some of which are used as organs of locomotion and others as sense organs of smell. At the tip of each arm there is a small eye protected by a circle of spines.

Starfish have well-organized nervous, digestive and circulatory systems. The stomach




(*a*) The most common Southern Pacific form; (*b*) found near Panama; (*c*) common near the coast of Massachusetts.

begins at the mouth and occupies nearly all of the central disk, as well as a small portion of each arm. The food of these animals consists chiefly of oysters, mussels, clams and snails. They prey upon oysters to such an extent that their depredations amount to a serious loss in some localities. It is estimated that the oyster beds of Rhode Island suffered a loss of $100,000 in one year from starfish. To reach the soft body of the oyster the starfish must force open the valves of the shell. This it does by pulling upon them with its tube feet. The oyster can withstand the strain for a time, but finally its muscles must relax. When the shell drops open the starfish ejects its stomach through its mouth opening, turning the organ inside out and applying it to the soft body of its victim. Digestion and absorption then take place.

Consult Romane's *Jellyfish, Starfish and Sea Urchins.*

**STARK,** JOHN (1728-1822), an American military leader, conspicuous in the Revolutionary War. Stark was a true patriot, for in 1776 he pledged his fortune to the soldiers, to induce them to reënlist. He was born in Londonderry, N. H., and while a boy was captured by the Indians, who styled him "the young chief." He fought in the French and Indian War, and at the beginning of the Revolution was appointed colonel. He was with Washington at Trenton and Princeton, then retired temporarily from service. Called again to take command of the New Hampshire troops, at Bennington, in August, 1777, Stark attacked the enemy with the order—"There they are, boys. We beat them to-day or Mollie Stark's a widow!" In this battle the second reënforcement of the enemy was defeated like the first, and the victory paved the way for the surrender of Burgoyne at Saratoga. Until the close

of the war he served at the head of various departments. Stark was rewarded by thanks from Congress and the rank of brigadier-general, conferred in October, 1777.

**STARLING,** a song bird related to the blackbird, common throughout the Old World. It is black in color, glossed with greenish, purple or lilac, and has its feathers tipped with buff. The *common starling* is a favorite bird in England, where it is resident for most of the year, retiring only in the coldest weather to Southern Europe or to North Africa. It is seen in large flocks even during the nesting season, and is invaluable to farmers on account of the numbers of insects it devours; in the fruit season, however, it eats so many berries, cherries and even apples and pears that it is considered somewhat of a pest at that time. It nests about buildings or in holes in cliffs. The eggs are four to seven in number and a light greenish-blue in color. About sixty common starlings were liberated in Central Park, New York, in 1890, and have spread to all parts of the city and surrounding country. Bird lovers of that section are doubtful as to the benefit of these newcomers because of their quarrelsome habits, which are driving out the native song birds.

THE STARLING

**STAR OF BETHLEHEM,** a small, hardy plant of the lily family, the flowers of which have the form of a six-pointed star. The petal-like sepals are white, but have green stripes on the outside, a color scheme repeated in the leaves, which are green with white stripes. The star of Bethlehem is a native of Italy, but has become a common garden plant in America. The flower stalk springs from a coated bulb.

**STAR ROUTES,** the name given to designated routes over which mail is transported, under private contract, in the United States, by messenger on foot, on horseback or by wagon. The name *star routes* was applied because in government records all such routes are marked by an asterisk, or star. Many people live in districts remote from railroads; this has been particularly true in the West, and in many sections the condition largely prevails to-day. Routes over railroads or by steamboat are not called star routes. It should be noted also that rural free delivery routes are not star routes. A star route is one in which mail is transported in bulk from a point where it leaves a train or steamboat to designated post offices, there to be distributed to individuals addressed. There are many star routes in the United States, but with the extension of railroad facilities they are constantly decreasing in number and in importance.

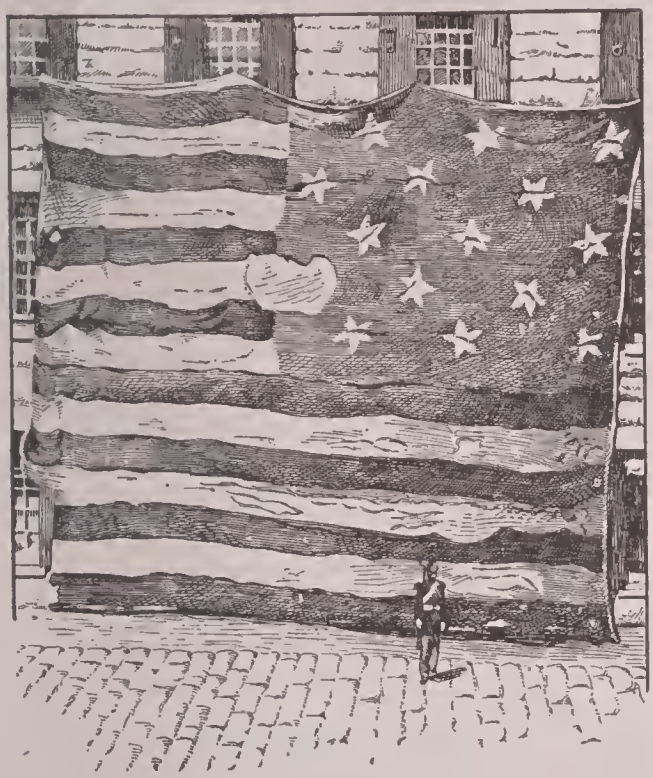
**Star Route Frauds.** This term was applied to irregularities in the postal service on star routes, discovered in the last days of the administration of President Hayes. Fraudulent petitions were forwarded to the postoffice authorities in Washington, urging the creation of new star routes and furnishing "estimates" for carrying the mails over them at prices far above the necessary cost of the service. These estimates were allowed, and the money fraudulently derived therefrom was divided among the parties to the plot. The guilty parties were finally exposed and the conspiracy was broken up in the administration of President Garfield. T. J. Brady, second assistant Postmaster-General, and S. W. Dorsey, a Senator from Arkansas, were tried for complicity in this plot, but were acquitted. William P. Kellog, a Senator from Louisiana, was also indicted in this connection, but his case was not tried. It is estimated that the plot, if successful, would have defrauded the government of half a million dollars a year. It is said that only one person connected with these frauds was ever punished, and he was believed to be innocent.

**STAR-SPANGLED BANNER, The,** an American patriotic song, written by Francis Scott Key. After the burning of Washington, D. C., by the British soldiers, in August, 1814, Dr. William Beanes of Upper Marlborough, Md., threw three British refugees into jail, and for this he was arrested by an English regiment and taken as a captive aboard a warship in Chesapeake Bay. John S. Skinner of Washington, and Key, then a young attorney in the District of Columbia, were granted permission by Secretary of State James Monroe to intercede for the doctor, and these two boarded the vessel just as it was preparing to bombard Fort McHenry, the chief protection of Baltimore. The British officers agreed to release Beanes, but refused to allow the two Americans to leave the vessel until after the battle, lest they should tell the plans to the patriots on land.

BIRTH OF THE AMERICAN FLAG.

Scene in the Betsy Ross house in Philadelphia, as pictured by the artist, H. Mosler.

On Tuesday, September 13, 1814, the bombardment began, continuing that day and almost all night. To Key and his companions it seemed impossible that the fort could survive the attack, as its guns were small and its

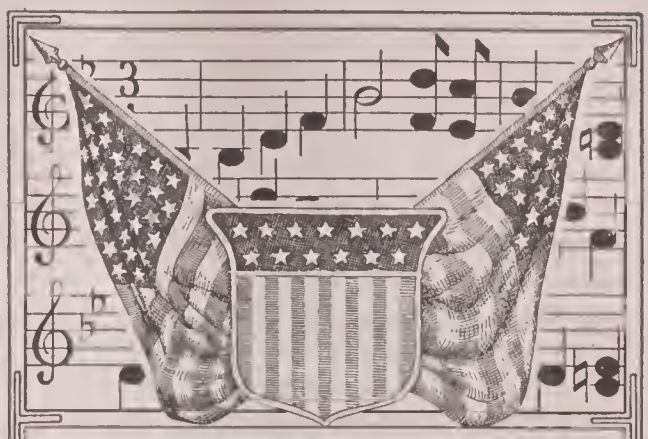


"THE STAR-SPANGLED BANNER"
The illustration is a drawing of the original flag which floated over Fort McHenry.

defenders were few. All night they walked the deck in anguish, and even when dawn came could not discover the outcome because of haze and smoke. Suddenly, at seven o'clock, a rift in the mist showed for a moment the flag gleaming over the walls. Thrilled by the sight, Key wrote the greater part of the poem in a few minutes on the back of an unfinished letter, and completed the stanzas that night in a Baltimore hotel.

The next morning the poem was printed on handbills, and during that day Key's brother-in-law suggested that it be set to the old English drinking tune, *Anacreon in Heaven,* which was already familiar to Americans as the air for a political song entitled *Adams and Liberty.* A few days later an actor named Ferdinand Durang first sang it in public at Baltimore. The composition immediately became popular, was played at the Battle of New Orleans, and is now played each evening at flag lowering in every American fort and garrison and on every American battleship throughout the world. The words of the song appear on this page.

The United States government keeps a flag floating continually over Key's grave at Fred-



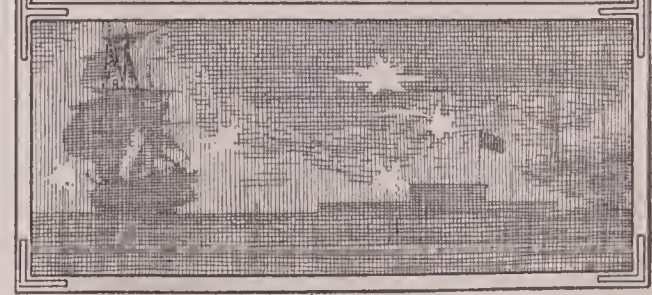
## *The Star-Spangled Banner*

[The third stanza is omitted.]

Oh! say, can you see, by the dawn's early light,
What so proudly we hailed at the twilight's last gleaming?
Whose broad stripes and bright stars, thro' the perilous fight,
O'er the ramparts we watched were so gallantly streaming?
And the rockets' red glare, the bombs bursting in air,
Gave proof thro' the night that our flag was still there.
Oh! say, does the star-spangled banner still wave
O'er the land of the free and the home of the brave?

On the shore, dimly seen thro' the mist of the deep,
Where the foe's haughty host in dread silence reposes,
What is that which the breeze, o'er the towering steep,
As it fitfully blows, half conceals, half discloses?
Now it catches the gleam of the morning's first beam,
In full glory reflected, now shines on the stream;
'Tis the star-spangled banner. Oh! long may it wave
O'er the land of the free and the home of the brave!

Oh! thus be it ever when freemen shall stand
Between their loved homes and the war's desolation;
Blest with vict'ry and peace, may the heav'n-rescued land
Praise the Pow'r that hath made and preserved us a nation.
Then, conquer we must, when our cause it is just,
And this be our motto, "In God is our trust."
And the star-spangled banner in triumph shall wave
O'er the land of the free and the home of the brave.



erick, Md., while on the other side of the continent a great statue in memory of him, the gift of James Lick, looks out upon the Pacific from Golden Gate Park, San Francisco.

On September 13, 1914, the city of Baltimore celebrated with an appropriate program the hundredth anniversary of the writing of the song. E.D.F.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| America | Hymns, National |
| Baltimore, subhead *History* | Key, Francis Scott |
| Hail Columbia | War of 1812 (with illustration) |

**STARVA'TION.** See FASTING.

**STARVED ROCK,** a picturesque, flat-topped bluff rising sheer above the water on the Illinois River (see illustration opposite page 2927, in article ILLINOIS). It is located near Utica, in La Salle County, Illinois. The rock is 125 feet in elevation and is one of the highest bluffs in the state. Here, in pioneer days, a band of Indians were besieged until they starved to death. From this episode came the name. Starved Rock and considerable surrounding territory have been constituted a state park by act of the legislature of Illinois.

**STATE,** a group of persons who are permanently located within a definite territory, wholly independent of any outside control, living under an organized government which is their supreme authority, and to which all render highest temporal allegiance. The ancient idea of the state was a system of tyranny, instituted for the purpose of forcing an unwilling service upon the people. The modern idea is that of a system of service for the people, to give them the largest possible freedom and to carry out the will of the people collectively expressed. Sir William Jones patriotically summarized the true meaning of the word, in his poem beginning—

What constitutes a state?
Not high-raised battlement, or labored mound,
Thick wall or moated gate;
Not cities fair, with spires and turrets crowned,
But men, high-minded men. . . . . .

In the United States the word is used for the political subdivisions of the Union. The name was originally chosen for each of the thirteen colonies, after they declared themselves independent of Great Britain and before they had adopted a Federal Constitution. At that time each state was an independent, sovereign power. When, by the adoption of a common Constitution, they formed the United States of

## *Outline on the State*

**I. Location**

(1) Latitude
(2) Longitude
(3) Boundaries
  (a) Natural
  (b) Artificial

**II. Size**

(1) Length
(2) Breadth
(3) Area
  (a) Actual
  (b) Compared with that of provinces and other states

**III. Physical Features**

(1) General surface facts
  (a) Mountains or hills
  (b) Plains
  (c) Watersheds
(2) Effects on climate
(3) Drainage
  (a) Rivers
  (b) Lakes

**IV. Climate**

(1) Conditions that might be expected, owing to latitude
(2) Variations and their cause
(3) Rainfall
(4) Healthfulness or unhealthfulness

**V. Resources and Industries**

(1) Minerals
  (a) Varieties
  (b) Location
  (c) Rank among states
(2) Agriculture
  (a) Crops
  (b) Stock raising
  (c) Dairying
  (d) Rank among states
(3) Fisheries
  (a) Sea or inland
  (b) Rank among states
(4) Manufactures
  (a) Principal articles produced
  (b) Rank among states

**VI. Transportation and Commerce**

(1) Railways
(2) Rivers and canals
(3) Commercial centers
(4) Value of trade

**VII. The People**

(1) Population
(2) Density
(3) Race
  (a) Native Americans
  (b) Foreign born
(4) Rate of increase
(5) Special characteristics

**VIII. Government**

(1) Departments
  (a) Executive
  (b) Legislative
  (c) Judicial
(2) Special features
(3) State institutions

**IX. Education and Religion**

(1) Public school system
(2) Institutions of higher learning
(3) Churches represented
  (a) Dominant religion

**X. History**

(1) Exploration
(2) First settlements
(3) Interesting events
(4) Admission to Union
(5) Recent progress

America, each gave up its sovereignty in regard to certain matters, and so ceased to be a state in the highest political sense.

**The Study of a State.** Like any other geographic unit, the state is best studied with the aid of an outline. The outline given herewith is applicable to all the states of the American Union, despite the differences of detail which must of necessity exist.

**STATE,** DEPARTMENT OF, one of the executive departments of the United States, established by act of Congress in 1789. Through the department the national government receives all communications from foreign countries or from individual states of the Union. The business of the department is divided among a number of bureaus and divisions whose names indicate their functions: divisions of Latin-American Affairs; of Far Eastern Affairs; of Near-Eastern Affairs and of information; bureaus of accounts; of rolls and library; of appointments; of indexes and archives and of citizenship; the consular bureau, and the diplomatic bureau. Besides the chiefs of these bureaus, the Secretary, is aided by three assistant-secretaries (salaries, $5,000 a year), a counselor (salary, $7,500) who is an expert adviser on international law and custom, and a solicitor (salary, $5,000), who is a general legal adviser.

**The Secretary of State,** like all other Cabinet officers, receives a salary of $12,000 a year, and is appointed by the President, to whom he is responsible and under whose direction he works. He has charge of negotiation of treaties and all correspondence with foreign nations, and is responsible for the publicity of treaties, laws and other public documents, and for the preservation of the originals. He is official keeper or custodian of the Great Seal of the United States, which must be affixed to proclamations, warrants and appointments by the President. He receives foreign ministers and ambassadors and presents them to the President, and he also prepares the credentials of American representatives abroad (see DIPLOMACY). He issues passports to American citizens who desire to travel abroad; formerly he signed them in autograph, but his signature in *facsimile* is now stamped on them.

These numerous duties, on all of which he must make annual reports, are in charge of a clerical force of about 150 people, but the Secretary's responsibility for them makes him logically the leader in the President's Cabinet. The Secretary of State stands first in the line of succession to the Presidency in the event of the deaths or permanent disability of the President and Vice-President. Besides standing first in rank, the department is also the oldest, for it is merely a continuation, under another name, of the Department of Foreign Affairs, the first executive department, established in 1781, under the Articles of Confederation. The position of the Secretary of State, while frequently compared to that of the Premier of Great Britain, is not like it, because the Premier is a legislator as well as an executive, and is responsible through Parliament to the people, whereas the Secretary of State is responsible only to the President, and has no influence, except such as his personal prestige commands, over Congress.

As the chief office next to the President, in the executive department of the United States, quite overshadowing the Vice-President, the Secretary of State has almost invariably been a man of outstanding ability, and in a few instances the Secretary has overshadowed the President who appointed him. W.F.Z.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Cabinet | Premier |
| Diplomacy | President |

**STATE BANKS,** banks chartered by state authority and conducted under strict supervision. A national bank, unless in a town of less than 3,000 people, must have at least $50,000 capital, but a state bank may operate with half that capital, in small cities. The banking methods of the two do not differ in any material respects in their relation to customers. See BANKS AND BANKING.

**STAT'EN ISLAND,** an island about five miles from the southern extremity of Manhattan Island, N. Y., forming the former county and borough of Richmond, but now a part of Greater New York. It is triangular in shape, thirteen and one-half miles long, with a maximum width of eight miles, and covers an area of seventy square miles. It is connected by ferry with Manhattan (New York City) and Perth Amboy, N. J. Fort Wadsworth and Fort Tompkins on Staten Island form the strongest defenses of New York harbor. The chief towns, or villages, are New Brighton, West New Brighton, Port Richmond, Stapleton, Tompkinsville, Tottenville and Richmond, the county seat.

The island was bought by the Dutch West India Company in 1630 from the Indians, who received in exchange "some kettles, axes, hoes, wampum, drilling awls, jew's-harps and divers

other small wares." In the Revolutionary War Staten Island was the scene of much fighting. See map, page 4205.

**STATES-GENERAL,** a legislative assembly in France which existed from 1302 until 1789. The term is also applied to the present Dutch Parliament. The States-General of France was composed of representatives of the clergy, the nobility and the common people, who constituted what was known as the Third Estate. Until the States-General of 1484, the representatives of the clergy and the nobility were summoned personally by the king, while the representatives of the Third Estate were elected by the people they represented. After 1484, however, the representatives of all three classes were elected by vote.

The States-General did not meet at regular intervals, but was called together by the king in times of emergency, whenever he needed advice or money or moral support. Direct power belonged exclusively to the king, but the influence and indirect power of the States-General were at times very great. By the year 1614, however, the power of this assembly had declined to almost nothing. When it was again summoned in 1789, the representatives of the Third Estate, who had been growing very powerful, made the famous decision which led to the French Revolution (which see), that the members of the States-General should constitute a national assembly with full sovereign powers, to be known as the National Constituent Assembly.

The States-General of the Netherlands, an assembly in which each province had one representative and one vote, was in existence in The Hague from 1593 until 1796, when it, too, became a National Assembly. The present Dutch Parliament, however, bears the name States-General.

**STATES' RIGHTS,** in American political history, a term used to characterize the view of those who held that the several states, in uniting to form a central government, surrendered none of their sovereign powers. The issue between the followers of Hamilton, who urged a strong central government, and the followers of Jefferson, who wished to maintain a loose federation of sovereign states, was debated at the very foundation of the United States; it was to remain an issue of importance until the War of Secession. Out of the doctrine of states' rights grew the doctrine of the rights of secession; this was the extreme and logical assertion of the sovereignty of the Southern states. Their failure to uphold their claims resulted in the removal of states' rights as a political issue of importance. In a less drastic form, the cleavage between the followers of Jefferson and the adherents of Hamilton may still be discerned in much political writing and speaking.

**STATICS,** *stat'iks,* a branch of dynamics. Dynamics treats of the properties of matter in motion and is divided into two branches—*statics* and *kinetics.* Statics deals with conditions under which there is no change of motion of material bodies when they are acted upon by various forces. When two or more forces so act upon a body as to produce no change of motion they are said to be *in equilibrium.*

**Related Subjects.** The following articles in these volumes should be read in this connection:

Composition of Forces — Mechanics
Dynamics — Physics

**STATUARY,** *stat'u a ri,* **HALL,** a large, circular room in the Capitol at Washington, on the main floor, directly beneath the great central dome of the building. Until 1857 it was the chamber of the House of Representatives. By act of Congress in 1864 it was created a memorial hall, to which each state may contribute two statues to honor the men or women whom it considers worthy of commemoration. The act reads as follows:

> The President is hereby authorized to invite each and all the States to provide and furnish statues, in marble or bronze, not exceeding two in number for each State, of deceased persons who have been citizens thereof, and illustrious for their historic renown or from distinguished civic or military services, such as each State shall deem worthy of this national commemoration: and when so furnished the same shall be placed in the old hall of the House of Representatives, in the Capitol of the United States, which is hereby set apart, or so much thereof as may be necessary, as a national statuary hall, for the purposes herein indicated.

This hall, which now echoes to the footsteps of the sight-seer, once rang with the eloquence of great men. If its walls could speak, they might tell of many historic events which they had seen. Here Madison was inaugurated as President in 1809 and in 1813, and Monroe in 1821.

Here the House of Representatives elected John Quincy Adams as President in the momentous election of 1825, and twenty-five years later Fillmore took the oath of office on the day after Zachary Taylor died. In this hall Henry Clay, as Speaker, presided for many

years over bitter debates on the War of 1812, on the Bank of the United States and the tariff. Here Webster, Calhoun, Douglas and Lincoln, among other great Americans, received their initiation into the nation's public life. These and other men discussed the issues which finally led to the War of Secession.

It is entirely fitting that this chamber should now contain the statues of some of the great men of a united nation. Each state, through its legislature, may select two citizens to be honored by statues in marble or bronze. Some of the states have as yet selected only one man, and a few are not yet represented. The only woman chosen is Frances Willard, whose statue was placed in the hall by Illinois in 1905. A complete list of all the statues, with the dates on which they were installed, is given below:

| STATE | NAME | DATE |
|---|---|---|
| Alabama | J. L. M. Curry | 1906 |
| Connecticut | Roger Sherman | 1872 |
| " | Jonathan Trumbull | 1872 |
| Idaho | George L. Shoup | 1909 |
| Illinois | James Shields | 1893 |
| " | Frances E. Willard | 1905 |
| Indiana | Oliver P. Morton | 1899 |
| " | Lew Wallace | 1909 |
| Iowa | James Harlon | 1909 |
| Kansas | John J. Ingalls | 1904 |
| Maine | William King | 1877 |
| Maryland | Charles Carroll | 1901 |
| " | John Hanson | 1901 |
| Massachusetts | Samuel Adams | 1873 |
| " | John Winthrop | 1872 |
| Michigan | Lewis Cass | 1889 |
| " | Zachariah Chandler | 1913 |
| Missouri | Francis P. Blair | 1899 |
| " | Thomas H. Benton | 1899 |
| New Hampshire | John Stark | 1894 |
| " | Daniel Webster | 1894 |
| New Jersey | Richard Stockton | 1886 |
| " | Philip Kearny | 1875 |
| New York | Robert R. Livingston | 1874 |
| " | George Clinton | 1873 |
| Ohio | James A. Garfield | 1885 |
| " | William Allen | 1887 |
| Pennsylvania | J. P. G. Muhlenberg | 1881 |
| " | Robert Fulton | 1881 |
| Rhode Island | Nathanael Greene | 1869 |
| " | Roger Williams | 1870 |
| South Carolina | John C. Calhoun | 1909 |
| Texas | Stephen F. Austin | 1904 |
| " | Samuel Houston | 1904 |
| Vermont | Ethan Allen | 1875 |
| " | Jacob Collamer | 1879 |
| Virginia | George Washington | 1908 |
| " | R. E. Lee | 1908 |
| West Virginia | John E. Kenna | 1901 |
| " | Francis H. Pierpont | 1903 |
| Wisconsin | James Marquette | 1895 |

**STATUTE,** *stat'ute,* a written enactment of an authorized lawmaking body. *Statute law* is another term for *written* law, and is to be distinguished from *unwritten,* or *common,* law. The bodies by which statute law is enacted are known variously as Congress, Parliament, Assembly, Legislature, etc. The ordinances of city boards of aldermen, or councils, are examples of local statute law, as are the regulations adopted by authorized boards of health and sanitation. These are called *ordinances,* also. The nature of statute law and its relation to other forms of law are discussed in these volumes under the heading LAW.

**STAUNTON,** *stawn'tun,* VA., the county seat of Augusta County, situated in the northwestern part of the state, 135 miles northwest of Richmond and 190 miles southwest of Washington. It is served by the Baltimore & Ohio and the Chesapeake & Ohio railroads. In 1910 the population was 10,604; it was 11,654 in 1916 (Federal estimate). The area is nearly three square miles. The city is the seat of Staunton Military Academy, Mary Baldwin Seminary and Stuart Hall, and it has the Western State Hospital for the Insane and the Virginia School for the Deaf and Blind. Prominent buildings are the city hall, courthouse and the Masonic Temple. Near by are cemeteries with graves of Confederate and Union soldiers killed in the War of Secession. The city has Gypsy Hill and Highland parks. Staunton is in a rich agricultural valley between the Alleghany and Blue Ridge mountains. Organs, overalls and flour are among the manufactures. The settlement was made near the present site of the city in 1731. The town was incorporated in 1761 and it became a city in 1870. It is the birthplace of Woodrow Wilson. G.B.A.

**STAVANGER,** *stah'vang er,* an important seaport of Norway, the capital of the amt (administrative division) of Stavanger. It is situated on the southwestern coast, on Stavanger Fiord, an inlet of the North Sea. Christiania is about 190 miles to the northeast. Stavanger is a very old town, built mainly of wood, and it is noted for its great merchant fleet. The foreign trade in fish, timber and marble is extensive, and there are shipyards, machine shops, cotton factories and woolen mills. An ancient cathedral, built in the Norman style in the thirteenth century, is a feature of interest. Population in 1910, 37,261.

**STEAD,** *sted,* WILLIAM THOMAS (1849-1912), an English journalist, born at Embleton. He received a little schooling at Wakefield, but at the age of fourteen began work as a clerk in a store at Newcastle-on-Tyne, reserving his spare time for education. When he was twenty-two years old he became editor of a small paper, *The Northern Echo,* at Darlington, and was so successful that in 1880 he was offered the position of assistant-editor of the *Pall-Mall Gazette* in London, and three years later became its editor-in-chief. In that paper he began a campaign for laws to protect women and children from outrages, and in 1885 wrote so bitterly of conditions in *The Maiden Tribute of Modern Babylon* that he was imprisoned in London for three months for libel. However, he had the satisfaction that year of seeing the laws passed for which he had striven.

In 1890 he founded the *English Review of Reviews,* in 1891 the *American Review of Reviews* and in 1894 the *Australasian Review of Reviews.* He did a work of genuine usefulness for British education when he began, in 1895, the publication of the *Masterpiece Library of Penny Poets, Novels and Prose Classics.* A visit to the czar of Russia in 1898 made him a zealous advocate of peace and his weekly paper, *War Against War,* together with numerous pamphlets urging arbitration, did much to direct public sentiment toward a demand for universal peace.

About 1905 he became a convert to spiritualism and four years later published a statement that he was receiving daily messages from his dead son. Shortly before his death he announced his intention of establishing in New York a spiritualistic station, much like a telephone central, where persons could deposit or receive communications connected with the other world. In the pursuance of this plan he sailed for the United States on the first voyage of the *Titanic,* and met his death with nearly 1,500 others when the vessel foundered off the Grand Banks, near Newfoundland, April 15, 1912. Among his most important books are *The Truth about Russia, A Study of Despairing Democracy* and *The United States of Europe.* A book which created an immense amount of discussion was *If Christ Came to Chicago;* in it he gave a vivid description of criminal tendencies in Chicago. M.T.

**STEAM,** *steem.* If you ask the average person whether he has ever seen steam he will answer "Yes." But he will be mistaken, for steam is colorless and invisible. Sometimes in watching the cloud that comes from the spout of a teakettle of boiling water you may notice that the vapor which is mistakenly called steam begins an inch or so from the spout. In the seemingly vacant space is the real steam, which is water transformed into gas; the visible cloud is water changed back into tiny particles of liquid by the cooler temperature of the air.

Steam may be caused either by evaporation or by boiling, but almost always hot steam is meant when the word is used. When water is heated to the boiling point, 212°, bubbles of steam begin to rise through it. Until all the liquid has become gas the temperature will remain at the boiling point. Meanwhile five and one-third times as much heat will have been expended as was necessary to raise the temperature from the freezing to the boiling point. This heat is known as the *latent heat* of steam, because it will be given off again when the gas is condensed to water.

Steam occupies more space than the water from which it comes. Just at the moment when boiling ceases, the gas is 1,644 times as great in volume as the former liquid. At this stage it is called *saturated steam.* If heated further its temperature and volume continue to increase, and it is known as *superheated steam.* This tendency to expansion makes possible the steam engine. *Wet steam* supports particles of water still in liquid form; *dry steam* contains only gas.

**Related Subjects.** Further information as to the nature of steam and its ability to do work may be found in the following articles:

Boiling Point
Evaporation
Steam Engine
Steam Hammer
Steam Shovel

**STEAM ENGINE.** No other period in the world's history has witnessed so many changes as the last 150 years. If Shakespeare had revisited England after a lapse of a century and a half he would have found everything very much as it was in his own lifetime, except for changes in fashion and politics, lesser differences in architecture, and strange talk about "the colonies." But now, after 300 years, he would seem to be in a new world. He would find huge cities where small towns had been, and in them he would see thousands of men and women busy in factories humming with the whir of steam-driven machines which unceasingly devour the cotton and wool, the grain and ore brought from the corners of the earth in steam-propelled ships and steam-drawn trains. At morning and night he could watch

WATT DISCOVERING THE POWER OF STEAM
From the painting by David Neal.

the toilers riding to and from their work in cars moved by the force once known to man only in the lightning, but now generated for his service by the all-powerful steam. And he would learn that in its short life the steam engine had transformed not merely his own island and the neighboring countries, but even lands which at his day no white man had seen.

The principle of the steam engine is simple. Energy is never lost; it may be changed from one kind of energy to another, or it may remain *latent,* or sleeping, for countless ages, but it is still capable of doing work. So man takes coal, in which energy has been stored by nature, burns it to bring out its energy in the form of heat, and places over the fire a boiler

of water to absorb the heat. When the water reaches the boiling point its molecules begin to move apart, driven by the energy that was in the coal but is now in a form in which, in its efforts to expand the steam, it will turn wheels for man.

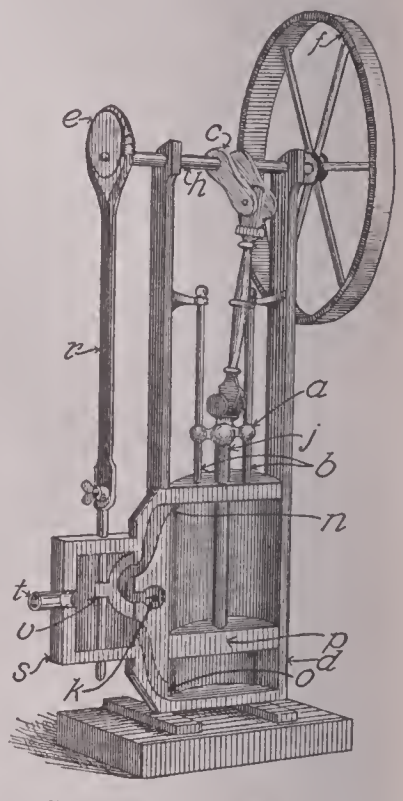
A century before the Christian Era there was in Alexandria a man named Hero who experimented with steam and constructed a device like a Barker's mill, but whirled by steam instead of water (see BARKER'S MILL). Nearly 2,000 years elapsed before the science of steam engineering advanced, and then, in the first year of the seventeenth century, an Italian named Della Porta wrote a book which told how to build a fountain whose waters would bubble up from the pressure of steam, and stated that when the steam cooled it would condense and draw up more water from below. Upon this power of condensation inventors relied as much as upon expansion, until the nineteenth century. The first engine of actual service, patented in England in 1698, was a pump which was but an elaboration of Della Porta's fountain, and the Newcomen engine, the best known when James Watt began his experiments in 1763, made no attempt at all to utilize the expansive power of steam.

Probably most people believe that James Watt was the inventor of the steam engine, and millions are familiar with the picture which shows him in boyhood, watching the steam clouds from the kettle. But Watt was only the improver, not the inventor. What he accomplished for the world was to reduce the cost of operating a *condensing* engine and to make it practical for other things than pumping.

The Newcomen engine set Watt to thinking, because it consumed an enormous quantity of steam, hence large amounts of fuel. It had a cylinder and a piston (see the illustration for explanation of these terms). The piston rod hung from one end of a beam and the weight to be lifted was suspended from the other end. The beam was pivoted at the center so that, like a seesaw, one end went up when the other end went down. Steam was admitted below the piston, whereupon the counterweight pulled the piston up. Cold water was then injected into the cylinder, so that the steam condensed and made a partial vacuum beneath the piston. The top of the piston was open to the air, which of course exerted a pressure of nearly fifteen pounds to the square inch on it, and when the vacuum was created beneath it, forced it down.

Watt saw that the alternate heating and cooling of the cylinder required large quantities of otherwise unnecessary heat. So he devised an engine in which the condenser and the cylinder were separate, and the latter always remained hot. As a result, three-fourths of the fuel cost for steam engines was eliminated.

Watt took out his first patents in 1769, and from that date we count the era of steam. He continued to make improvements on engines, perhaps the most important of which was the introduction of the principle of double action, in which steam is used first on one side of the piston, then on the other, as in the engine shown in the illustration. He also learned to shut off the steam when the cylinder was only partly filled, relying on expansion to complete the stroke. But he never experimented in the use of high-pressure steam; his own pressures were not much greater than the fifteen pounds per square inch of the air, while to-day pressures of over 1,000 pounds are practical and are frequently employed.




A SIMPLE STEAM ENGINE

Steam comes from the boiler through the pipe *t*. If the slide valve *v* is in the position shown, steam rushes through the port *o* into the cylinder *d*, forcing up the piston *p*, thus turning the crank *c* and supplying power to the flywheel *f*. As the piston rises, the contents of the cylinder are expelled into the exhaust port *k*, from which they can escape to a condensing chamber or to the outer air. The turning of the shaft *h* revolves the eccentric *e* at end of shaft, which thrusts the rod *r* down and moves the slide valve to the lower end of the steam chest *s*, so that the port *n* receives steam to force the piston down again, and the port *o* is connected with the exhaust. The crosshead *a*, sliding on the guide bars *b*, keeps the piston rod *j* in a straight line.

The two most radical improvements in steam engineering since Watt's day are the introduction of the compound engine and of the turbine. In the former, high-pressure steam does work in one cylinder, then passes to another, or even to a third and a fourth. The turbine is described in these volumes. C.H.H.

Consult Whitham's *Steam Engine Design;* Spangler's *Elements of Steam Engineering.*

**Related Subjects.** The following articles should be read in this connection:

| | |
|---|---|
| Governor | Steam |
| Horse Power | Turbine Wheel |
| Injector | Watt, James |

**STEAM HAMMER.** The steam hammer was invented by James Nasmyth in 1839, and immediately revolutionized all industries in which heavy forging was necessary. The Nasmyth hammer, as it was originally called, was raised by steam admitted into a cylinder beneath it. When raised to the required height the steam was allowed to escape and the hammerhead fell by force of gravity. The head might weigh 100 pounds or as much as 100 tons. In the modern steam hammer, steam is admitted alternately above and below the hammerhead, the pressure of the steam from above adding to the force of the downward stroke. So perfect is the control of these mighty hammers that a blow with a force of hundreds of tons may be given or one so gentle as to crack a nut without injuring the kernel. Electrically-operated hammers are coming more and more into favor, and can be made as powerful as the largest steam hammers.

**STEAM'SHIP.** See SHIP.

**STEAM SHOVEL,** *shuv''l,* a large scoop operated by steam power. The scoop, or bucket, is attached to a beam which can be moved in any direction and raised and lowered at will, power being applied from a hoisting engine. The bucket is of iron or steel, with a capacity of from half a cubic yard to five cubic yards. It has teeth arranged along the front so as to cut into earth or loose rock. The bottom is hung on a hinge, so that when a catch is released, the load may be emptied instantly. The method of operation is quite simple. The dipper is lowered to the ground and driven forward and upward with a powerful sweep, gathering earth and rock as it goes. The beam is then swung into any desired position, and the shovel emptied into cars or wagons, which remove the earth.

Commonly all the parts of a steam shovel are mounted on a movable car. The great steam shovels with which the Panama Canal was excavated are capable of handling from four to five thousand cubic yards of rock or ore in a day. Steam shovels are extensively used in digging and loading ore in the iron mines of the Great Lakes region and for digging canals and cuts.

**STEARIC ACID,** *ste air'ik as'id,* a solid, fatty acid which, when combined with glycerine, forms *stearin,* an important constituent of fats. See STEARIN.

**STEARIN,** *ste'a rin,* a combination of stearic acid and glycerine, is the chief ingredient in mutton suet, beef tallow and certain vegetable fats, such as palm oil. When crystallized, stearin forms pearly, waxlike scales, having neither taste nor odor, soft to the touch and not greasy. It cannot be dissolved in water, but is soluble in ether and hot alcohol. When treated with superheated steam it is resolved into its component parts—glycerine and stearic acid. When stearin is boiled with alkali the stearic acid combines with the alkali to form soap, and the glycerine is separated. Stearin is prepared for practical use from beef suet, cottonseed oil and other fats. It yields an oil employed in the manufacture of butterine.

**STEATITE,** *ste'a tite,* a soft rock, composed chiefly of talc, and having a soapy or greasy feel. It ranges in color from light gray to almost black. Steatite is easily sawed into slabs and was formerly used in the manufacture of stoves in which wood was used for a fuel. The French chalk used by tailors is made from a white variety of steatite. In localities having cold winters small blocks of steatite are used for foot stones, because they hold the heat for a long time. In New England these stones are called *freestones.* Because of its peculiar oily feel, steatite is often called *soapstone.*

**STED'MAN,** EDMUND CLARENCE (1833-1908), an American poet and critic, born in Hartford, Conn. He studied at Yale, and became editor of the Norwich *Tribune* in 1852, later was connected with several other papers, serving on the New York *Tribune* and as a war correspondent for the New York *World* during the War of Secession. In 1869 he entered on a business career as a banker and broker, and retired from active life in 1900.

But his chief interest was always in literary work. *The Diamond Wedding,* a satire on society in verse, first attracted general attention to him. His *Alice of Monmouth* is the best narrative poem called out by the War of Secession, but perhaps the best known of his verses is *Pan in Wall Street.* For twenty years Mr. Stedman devoted himself to critical writings, but in his last years returned to poetry. *Victorian Poets* and *Poets of America,* his first critical works, he supplemented by *A Victorian Anthology* and *An American Anthology.* He

aided in the preparation of an eleven-volume *Library of American Literature* and edited, with George E. Woodberry, the *Works of Edgar Allan Poe.*

**STEEL,** a variety of iron that contains less carbon than cast or pig iron, and more than wrought iron. Steel is superior to other forms of iron for many purposes, since it is more elastic, stronger and capable of being tempered to various degrees of hardness. Steel is made by burning the carbon out of pig or cast iron, or by burning carbon into wrought iron. Three varieties of steel are recognized, according to the percentage of carbon in the metal, namely, soft or mild steel, medium steel and hard steel. But steel is generally named after the process of its manufacture.

**Crucible Steel.** The finest of steel, such as that used in razor blades and watch springs, is a product of the crucible process. Bars of wrought iron are placed in retorts of clay or graphite with layers of charcoal, and are melted in furnaces. Other ingredients, the chief of which is manganese, are often added. The molten iron takes up a certain portion of carbon, and when it is allowed to harden in ingots, cast steel is produced. Crucible steel is the highest grade of steel made, and it is used for making tools and in other fine mechanisms. For this reason it is sometimes called *tool steel.*

**Bessemer Steel.** About the middle of the last century Sir Henry Bessemer, an Englishman, invented the process which bears his name. Its effect on the production of steel was revolutionary, since it reduced the cost of manufacture to a figure so low as to extend the use of steel from the production of such small articles as knives, springs, etc., to that of rails and the framework of bridges and buildings. Bessemer reversed the process described above; instead of adding carbon to wrought iron, he burned it out of cast iron. The smelted iron is either used directly from the blast furnaces or is run into converters, which are vessels shaped somewhat like an eggshell and swung on trunnions, so that they may be tipped to a horizontal position for emptying the liquid. Each converter has a capacity of from ten to twenty tons. The lining is of fire brick, about a foot thick. The bottom is pierced by a number of small holes, through which air is forced from a blast under pressure of from ten to thirty pounds to the square inch. The blast burns out the carbon and silicon. When only the desired proportion of carbon remains, a small quantity of an alloy of carbonized iron and manganese is stirred into the fluid, which is then poured into ladles and run into casting molds. The time consumed in the blowing process is from nine to twelve minutes.

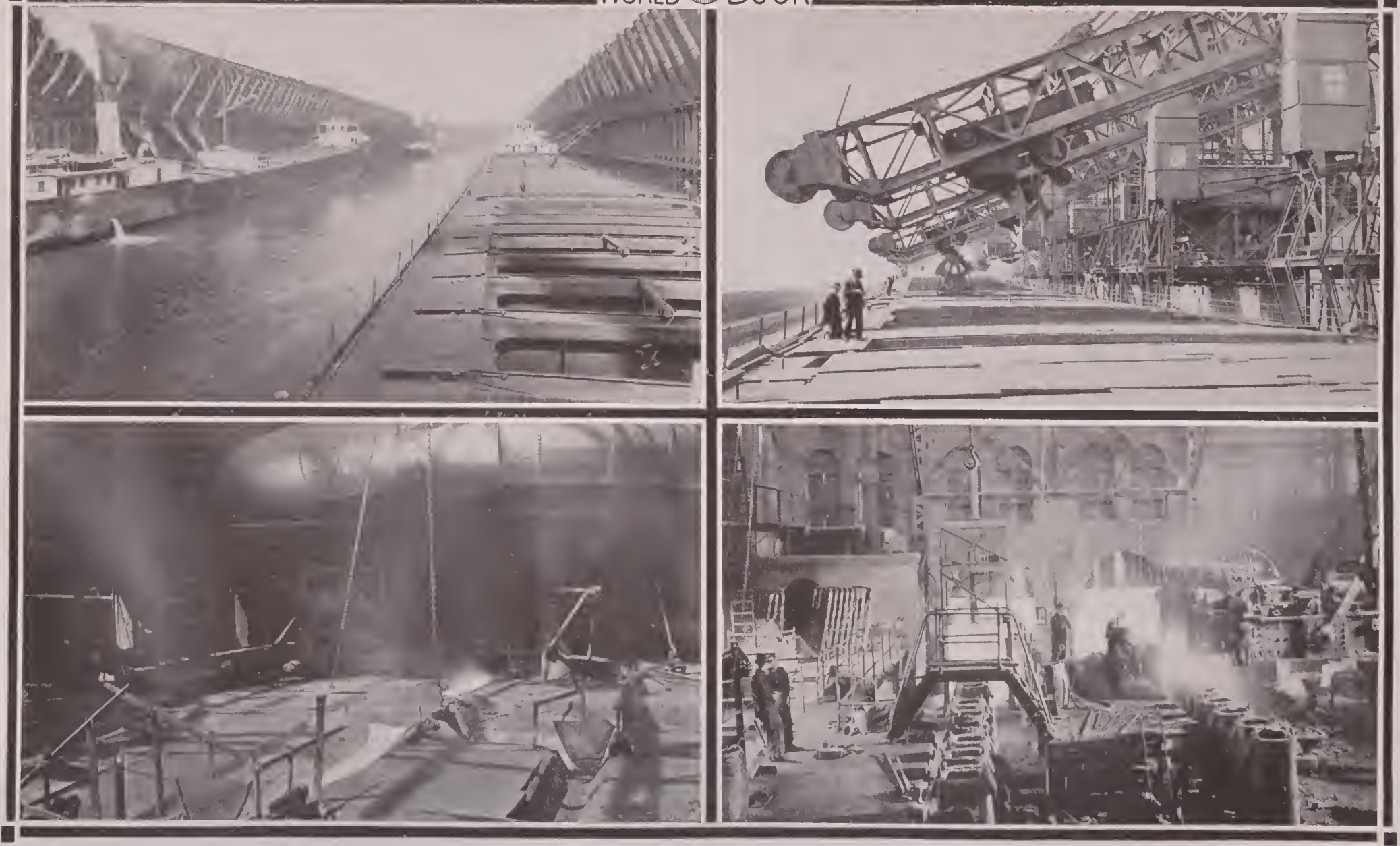
**Open-Hearth Steel.** This steel takes its name from the fact that the iron is melted in an open-hearth furnace. This furnace resembles the puddling furnace used for wrought iron. The material used was originally a charge of pig iron treated with iron ore; later, pig iron and steel or fragments of wrought iron were melted together. One of the advantages of the open-hearth process is that it provides for the utilization of steel scraps, old rails and fragments of wrought iron.

Most of the steel of commerce is produced either by the Bessemer or by the open-hearth process. Such steel is used for railroad rails, structural material, nails and wire. Steel has taken the place of iron for nearly all structural purposes.

**Alloys.** There are nearly as many varieties of steel as there are uses for the valuable material, and these varieties are formed by mixing a small quantity of some other metal with the steel when it is in a molten state. The metals most used are nickel, manganese, tungsten, uranium and vanadium, each imparting a peculiar quality to the steel. Vanadium steel, for instance, has a wonderful power to resist shocks, and it is extensively employed in the manufacture of automobiles. Nickel steel is used in the manufacture of armor plate (see WARSHIP). Tungsten steel is valuable in the manufacture of tools.

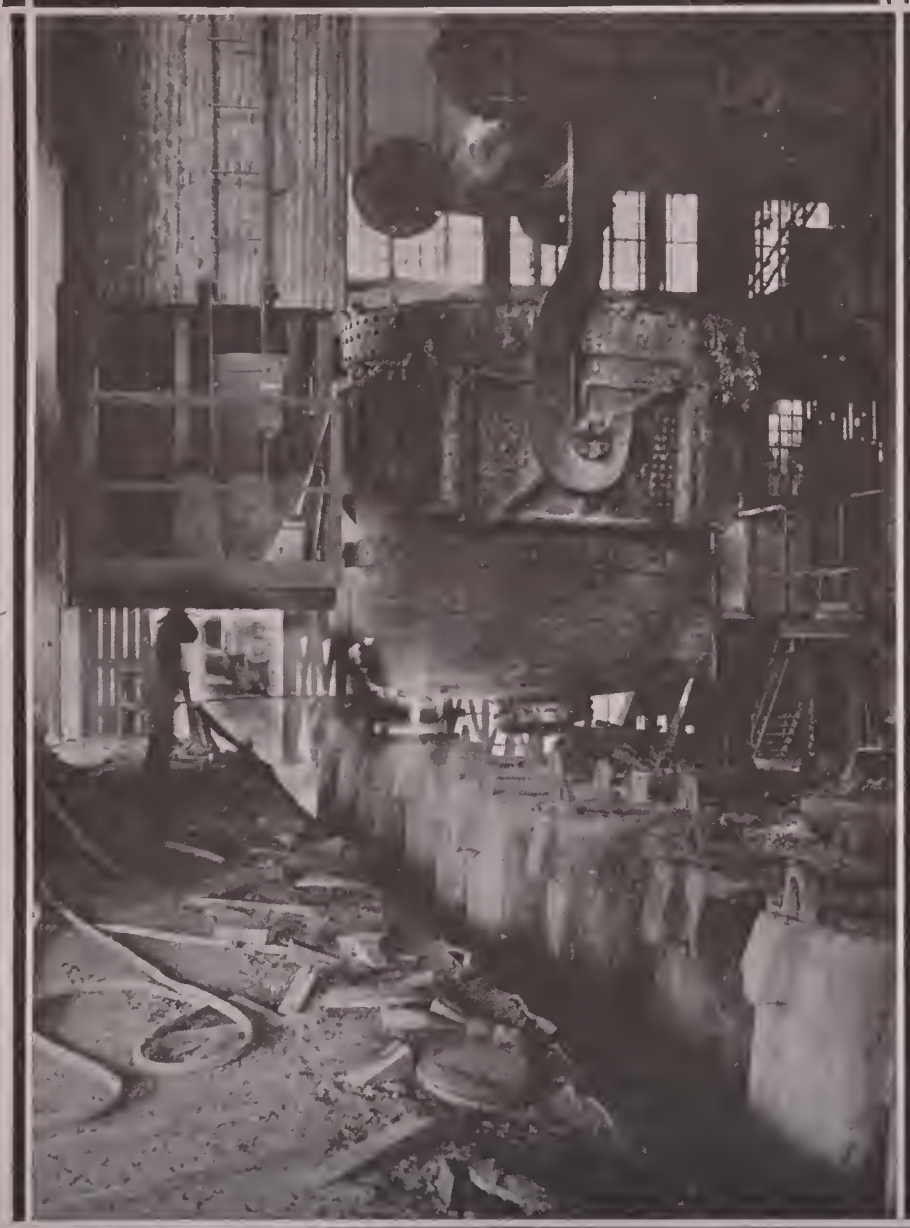
**Tempering.** When steel is heated and plunged into cold water, it becomes hard enough to cut glass. But the hardest steel is not suitable for tools, and tool steel is put through a process of tempering. This is accomplished by heating hard steel to a certain temperature and allowing it to cool slowly. The amount of heat determines the temper of the steel. Thus, razor blades are shaped from steel that has been heated to 430° F., whereas sword blades, which require greater elasticity, are produced at a temperature of about 550° F.

**Production.** Of the three processes described above, the first produces the finest quality of steel, but the production is relatively small because the demand is light. Bessemer steel formerly led in the tonnage produced, but the production of open-hearth steel has steadily gained of late and now takes first place. The United States leads the world in steel production, and in this country the gain of the open-



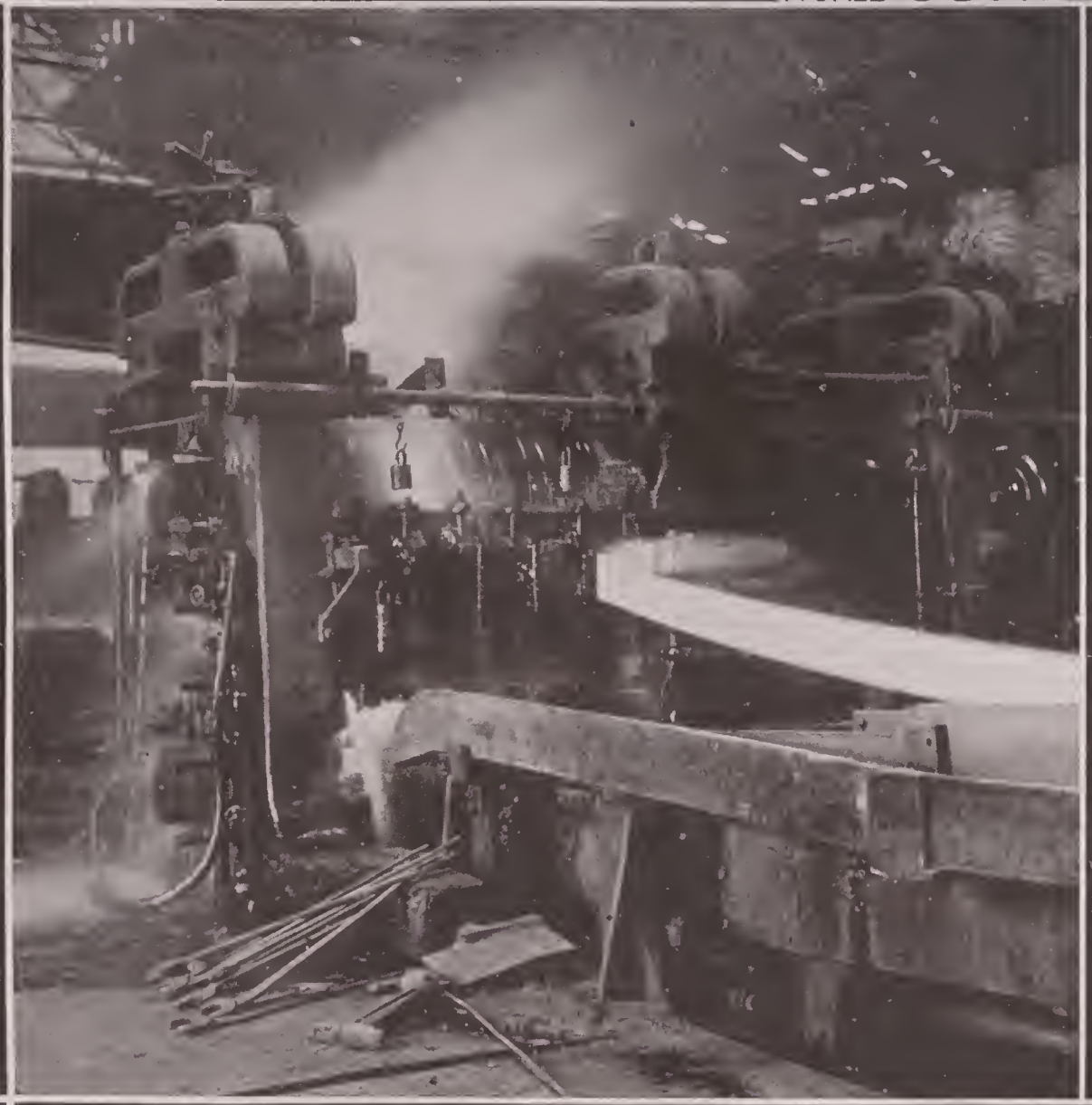
**STEEL MAKING.**

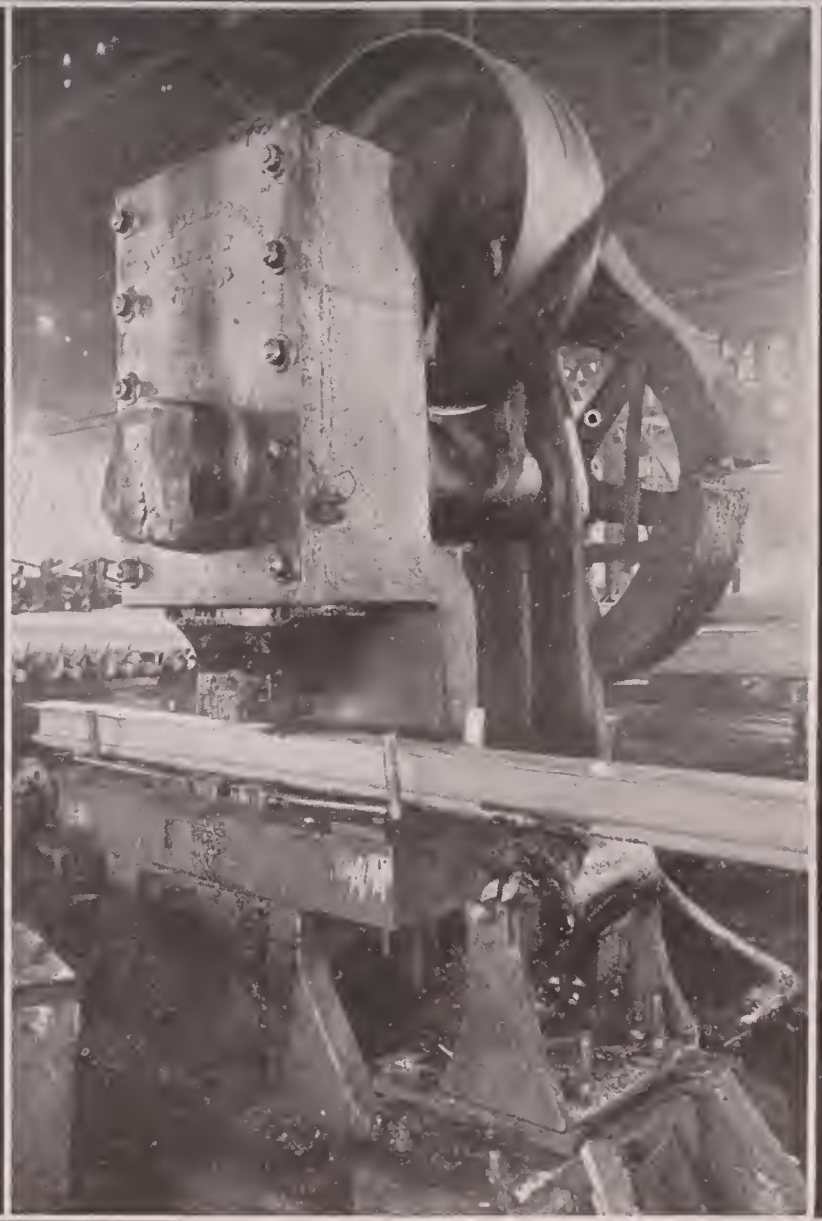
Left, upper, loading ore boats on Lake Superior; right, upper, unloading ore at steel mill. Left, below, tapping molten iron from furnace; right, below, pouring Bessemer ingots. In the containers the iron is cooled.



STEEL MAKING.

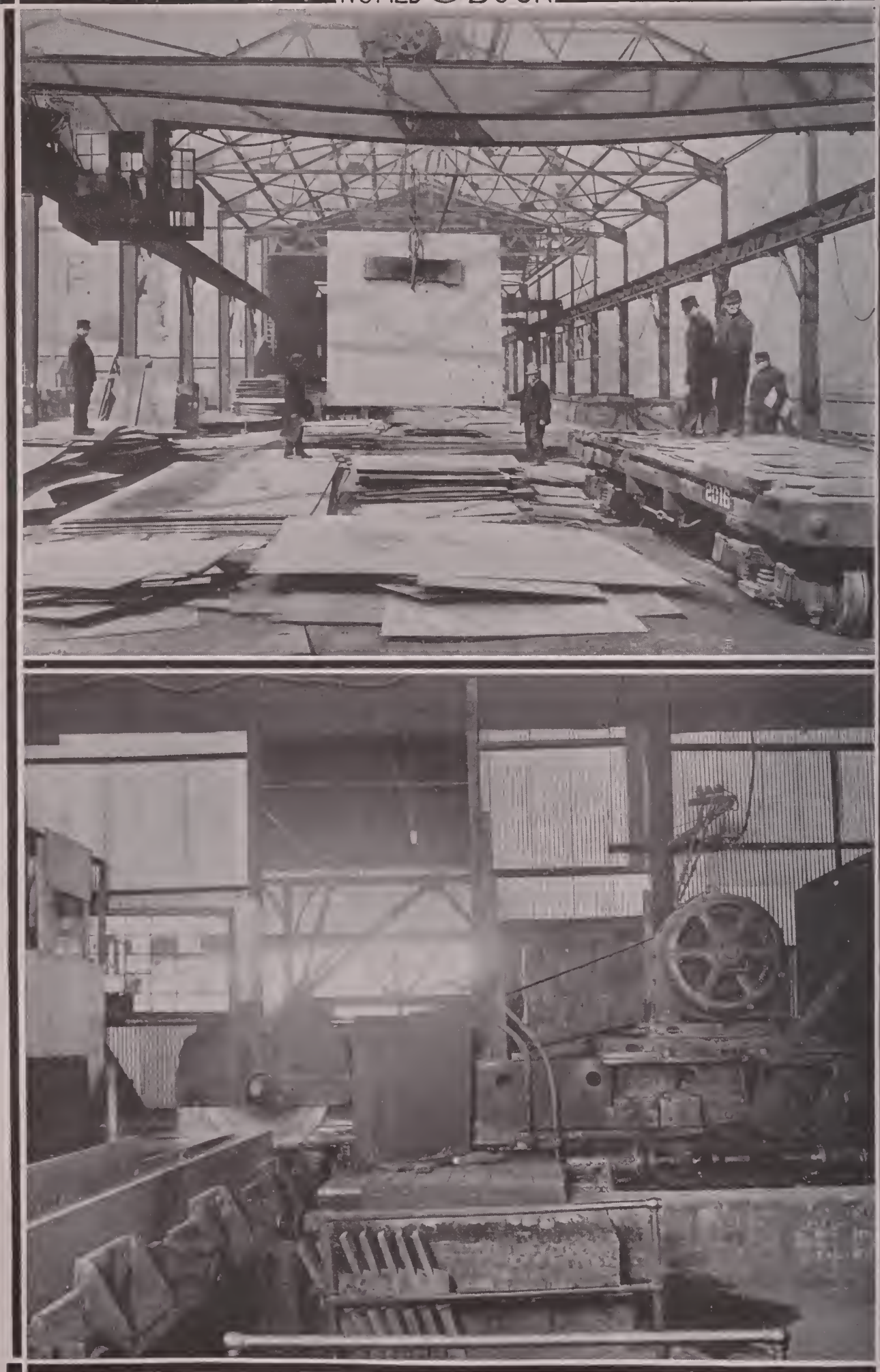
At left, pouring ingots by the open-hearth method. At right, an ingot on its way to the rolls, to be made into a railroad rail.





MAKING A STEEL RAILROAD RAIL.

At left, steel rail emerging red-hot from rolls. At left, the same rail, cooled, entering the straightening press.



**STEEL MAKING PROCESSES.** Above, powerful electric magnet, used in inspecting and loading steel plates. Below, a saw which easily cuts steel rails.

hearth furnace has been very marked. An idea of the rapid growth of the steel industry in the United States is conveyed by the fact that in the five years prior to 1909 the value of the output increased 46.3 per cent. The production in 1915 amounted to 32,151,036 tons. The annual production of Canada is over 1,000,000 tons. The two leading European steel countries are Germany and Britain. C.H.H.

Consult Campbell's *Manufacture and Properties of Iron and Steel;* Stoughton's *Metallurgy of Iron and Steel.*

**Related Subjects.** In connection with this article on steel, the reader may consult the following topics in these volumes:

| | |
|---|---|
| Annealing | Damascus, subhead |
| Bessemer, Sir Henry | *Damascus Steel* |
| Iron | Tempering |

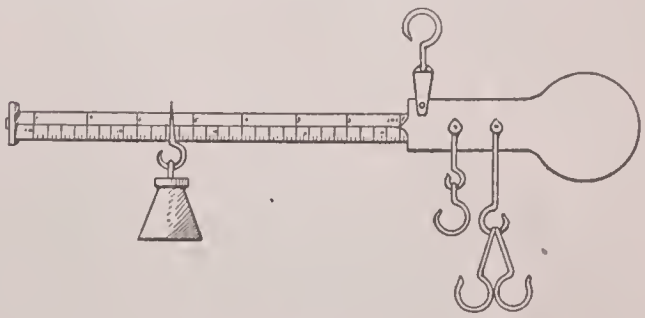
**STEELE,** *steel,* Sir Richard (1672-1729), a British writer, famous chiefly for his influence upon the early development of the magazine. He was born in Dublin, and educated at the Charterhouse School and at Oxford. After entering the Life Guards in 1694, he wrote a poem in honor of Queen Mary's funeral, and in consequence was given the rank of captain. He had been serving in the army for seven years when he produced *The Christian Hero,* a work intended for his own moral instruction. Soon afterward appeared his comedy, *The Funeral,* succeeded by two others, *The Lying Lover* and *The Tender Husband.*

In 1705 he married a widow, Mrs. Margaret Stretch, who lived for only a year afterward. Following her death Steele was made gazetteer by the government, and shortly afterward married a rich Welsh lady. Later he became commissioner of stamps, justice of the peace in Middlesex, and in 1713 a member of Parliament. Within a year he was expelled from that body because of ideas expressed in an essay on politics, but in 1715 he was again returned. His later life was devoted largely to work on his periodicals. In 1722 he produced a comedy, *The Conscious Lovers,* which was well received and was recognized by the king with a generous gift of money.

Steele stands out in the history of English literature as the originator of the periodicals in which appeared essays on manners and customs, morals, politics and other subjects of public interest. The *Tatler* (1709-1711), issued three times a week, was the first of these publications. Addison, a university friend of Steele's, became a contributor to it as well as to its successor, the famous *Spectator,* for which he wrote 274 essays and Steele 236. *The Guardian,* a third undertaking not long continued, was followed by a series of much less successful periodicals of the same type. The influence for good which the *Spectator* had on the morals and manners of the age was due in large part to Steele.

**STEEL'TON,** Pa., an industrial borough in Dauphin County, three miles southeast of Harrisburg, on the Susquehanna River and on the Pennsylvania and the Philadelphia & Reading railroads. It is the center of extensive steel enterprises, including bridge and construction works, blast furnaces and rail mills, and has manufactories of cigars and hosiery. It contains a Federal building, churches and schools. In 1910 the population was 14,246; it was 15,548 (Federal estimate) in 1916. The area of the borough is about two square miles.

**STEEL'YARD,** in mechanics, a device in common use for weighing groceries and other commodities. It consists of an iron bar having one long arm and one short one, and is a lever of the first class (see Lever). The article to be



THE COMMON STEELYARD

weighed is usually hung by a hook, or scale pan, from the end of the short arm; the counterpoise, whose weight is known, is hung on the long arm, which is marked off into notches (see illustration). To obtain the weight of an article the movable weight is shifted on the long arm until there is a balance, and the number at which the weight rests indicates the number of pounds or other unit. The device is usually hung from a fixed support by a ring or hook.

**STEEN,** *stayn,* Jan (1626-1679), a foremost painter of Holland, ranking next to Rembrandt, among painters of the Dutch school, in range of subjects and ability to portray scenes of everyday life with dramatic effect. Like the English painter Hogarth, he could put a touch of satire into his work, but usually he painted with genial good humor. There was no phase of Dutch life that Steen did not depict; he represented with admirable insight the joys and the sorrows of people in all classes of society. His best canvases are distinguished for their

clear coloring and excellence of composition. That he was an industrious worker is known from the large number of pictures he left—about a thousand, according to one authority. Aside from the facts that he was born at Leiden and studied in Utrecht and Haarlem, little that is authentic is known of his life. Among his notable works are *Eve of Saint Nicholas, The Rustic Wedding* (both at Amsterdam), *The Menagerie* (The Hague) and *The Music Master* (National Gallery, London). The Metropolitan Museum, New York, possesses three examples of his work.

**STEFÁNSSON,** *sta'fahns sohn,* VILHJÁLMUR (1879- ), a Scandinavian explorer who led an expedition which discovered a new land in the Arctic Ocean (1915). This, his third northern trip, was made under the auspices of the American Museum of Natural History and the National Geographic Society, and was financed by the Canadian government. Its object was the exploration of the regions to the west of Parry Archipelago. About six months after sailing from Victoria, British Columbia, in June, 1913, the *Karluk,* largest of the three expedition boats, prepared for three years of scientific work, and carrying expert scientists of several nations, was caught in the ice and sank, with a loss of eleven lives. Stefánsson, with several others of the party, happened to be ashore caribou hunting at the time of the disaster, and was saved.

Undismayed, the explorer resumed the journey by sledge. He and a supporting party left Collinson Point, Alaska, in the spring of 1914, the supporting sledge turning back when seventy-five miles away from shore. Stefánsson pushed on with two men and six dogs, making a three-months' journey across a moving ice pack of the Arctic Ocean. At this time he surveyed large areas of the sea to the north of Alaska and to the west of Banks Land. In February, 1915, he started north by sledge from Cape Kellett, Banks Land, and on this expedition discovered on June 18 an unknown mountainous region near the seventy-eighth parallel, extending from southeast to northwest for one hundred miles. In 1916 he resumed his exploration of the Arctic land areas.

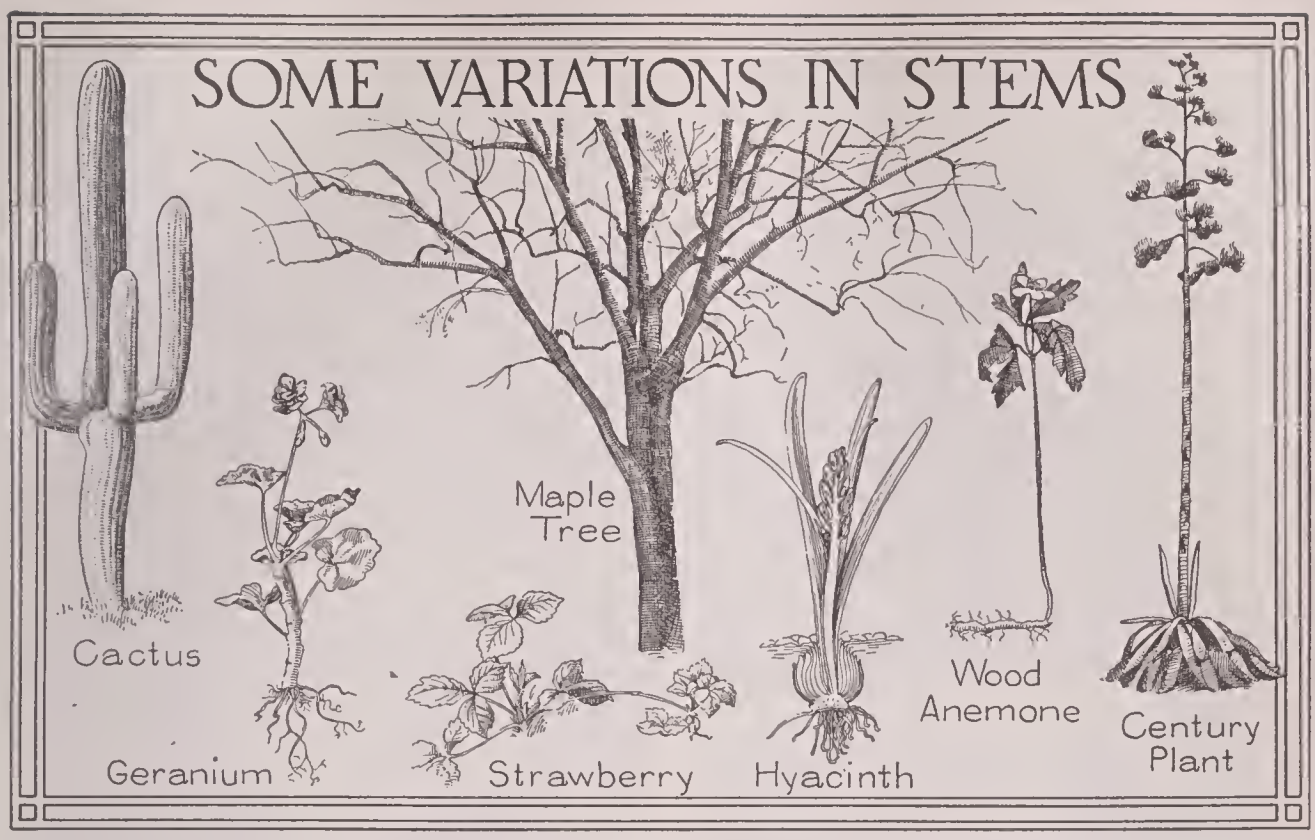
**STEIN,** *shtyne,* HEINRICH FRIEDRICH KARL, Baron vom (1757-1831), a German statesman who introduced many internal reforms in Germany, was born near Nassau. He attended the University of Göttingen, where he studied jurisprudence, history and politics. Stein visited many of the capitals of Europe, and in June, 1785, was appointed Prussian ambassador to Mainz, Zweibrücken and Darmstadt. But not liking the diplomatic service, he went to England the following year to make a study of political institutions, there gaining knowledge which later assisted him greatly in the conduct of Prussian affairs.

In 1796 he was appointed supreme president of the Westphalian chamber of commerce and mines, and in 1804 became Minister of State for Prussian trade. Stein instituted many reforms, abolished restrictions on internal trade and developed the resources of the country. He was offered the portfolio of Foreign Affairs, but declined it. Being displeased with the existing administration, and very outspoken, he soon offended the conservative Prussians and was dismissed by the king in 1807. Meanwhile, Napoleon completed the ruin of Prussia.

But the Peace of Tilsit (July 7, 1807) made clear the wisdom of Stein's advice, and he was recalled and made virtual dictator of impoverished Prussia. He immediately set about introducing various reforms, abolishing serfdom, installing municipal and military reforms, granting local self-government to all Prussian towns, and opening the way for German unity. A letter criticizing Napoleon's policies having been traced to Stein, that ruler ordered the minister's property confiscated and demanded that the king should dismiss him. Stein resigned in November, 1808, and retired to Austria, where he spent three years. In 1812 he was invited by the Emperor Alexander to Saint Petersburg, and later was requested to act as provisional administrator of East and West Prussia. Stein took part in the drafting of the Russo-Prussian convention in 1813, and after the Battle of Leipzig openly denounced Napoleon.

He was consulted in all the military diplomacy of this unsettled time, but many of his theories were opposed by the narrowness of the German statesmen. The federal system of government promised by Frederick was postponed, and in 1815 Stein, finding himself helpless to mend matters, retired, giving his time to the promotion of art and science in Germany. He died in Kappenberg, Westphalia, June 29, 1831.

**STEINBOK,** *stine'bahk,* or **STEEN'BOK,** a very small antelope found in the southern part of Africa. Its Dutch name, which means *stone-buck,* was given because it is usually found in rocky places. The steinbok is about twenty-four inches tall, and has a reddish-brown coat that is white underneath. The male has two




forward-curving ringed horns, about four inches long. The European ibex is also frequently called a steinbok.

**STELLARTON,** *stel' ahr ton,* a town in Pictou County, Nova Scotia, in the north-central part of the Nova Scotia peninsula. It is on the East River and on the Intercolonial Railway, two miles south of New Glasgow and ten miles south of Pictou Landing. By rail to Pictou the distance from Stellarton is thirteen and a half miles. Stellarton is in a prosperous coal-mining district, and is noted for a seam of coal, thirty-seven feet thick, said to be the thickest seam in the world. The town has many large industrial establishments, including a carriage factory, railway repair shops, cigar factory, woodworking factories and bakery. It is a distributing point for farm machinery, vehicles and packed meats. Population in 1911, 3,910; in 1916, about 4,500.

**STEM,** the stalk of a plant, shrub or tree which supports the leaves in the most advantageous position to receive light and air. It is a coworker with the leaves in changing the raw materials obtained from the soil into plant food. The water and dissolved salts taken in by the roots are carried to the leaves by the stem. There they are converted into plant food by the sunlight and air, and this newly-made food passes through another set of cells in the stem to the parts of the plant where it is needed, or is stored away for future use.

In green-stemmed plants the stalk shares the work of the leaves in converting the raw materials into plant food, but when the green cells are shut away from the light by a thick, corky bark, the stem serves only as a channel for the plant juices and as a support for the leaves and branches. In leafless plants like the cactus, the thick, green stems, which are usually broad and flattened, exposing a large surface to the light and air, perform the functions of the leaves. This fleshy stalk also stores water to supply the plant in times of drought, and has allayed the thirst of many a traveler in the arid plains of Southwestern United States. Some desert plants store a sufficient amount of water in their stems to carry on growth for ten years or more.

The stems of marsh and water plants contain passages and cavities for the storage of air to supply the plant when it is submerged and to buoy up the leaves.

**Structure and Growth.** If a leafstalk of celery is dipped into an aniline dye and then removed and examined, it will be seen that there are definitely-stained regions, showing that the liquid passed upward into the leaf by certain tissues, or bundles of long, narrow, tubular cells. These are called *fibrovascular bundles,* a term which simply means *collections of threadlike tubes.* Those plants in which the bundles of cells are distributed irregularly throughout the stem, as in the cornstalk, are

the *monocotyledons*. The group in which the cells are arranged in circular form around the pith, as in our common trees, are the *dicotyledons*.

The stems of the latter plants consist of an outer, protective covering of bark and a woody layer containing the bundles of cells surrounding the pith. The cells are of several kinds. A layer of cork cells lies just beneath the bark to prevent loss of water; flexible, tough, fibrous cells give strength to the stem; tubular cells carry the plant food from the leaves; woody cells form the channel through which the water passes to the leaves from the root, and just outside of this woody section are the growing cells, which form new bark on their outer side and new wood on the inner side. The lifetime of a tree is reckoned from the number of rings or layers of new wood formed by these growing cells.

In some plants the stems live but a year, in others two years and in still others, indefinitely. The death of annual stems is not due to the arrival of cold weather, as is often supposed, but to the fact that the cells can develop only a certain amount of new tissue, and when growth stops, the stem dies. Thus the life of the plant is limited to a certain period even in regions where there is no cold winter and not even a single frost.

Stems vary greatly in thickness, ranging in width from the immense trunks of the Big Trees of California to the slender aspen stem which is so delicate that the leaves constantly quiver and softly rustle, giving the tree the name "trembling-leaved poplar." The rate of growth also varies in different plants. The sunflower and giant ragweed stalks grow ten or twelve feet in a season, and slender, climbing stems often grow forty feet in a single summer, while many trees increase in height but one to three inches a year. In the competition to secure light and air, trees in dense forests and plants in thick clumps grow tall and branchless for a great height, but when growing alone they are low and broad-topped.

**Underground Stems.** The long, slender rootstocks of the May apple, Solomon's seal, mints and several other plants, the short, thick bulbs of the hyacinth and lily and the familiar tuber of the potato are underground stems. They contain large quantities of stored food and supply the plant when new food cannot be made. Some produce an aërial stem and others send up leaves and have no stem above the ground.

**Reproduction by Stems.** Many plants are reproduced by portions of the stem. Our most obnoxious weeds are those which have underground stems, or rootstocks, which, though cut by the hoe, produce a new plant at every node. The slender, underground runners of the strawberry, the bulbs of the lily and tubers of the potato also produce new plants. The black raspberry forms a new bush by the rooting of an ordinary branch, and many plants, such as the snap willow, geranium, grapevine and currant bush are reproduced from cuttings, or broken-off stems, which take root when planted. The propagation of orchard trees by budding and grafting is of vast importance in the modern cultivation of fruit. See GRAFTING.

**Economical Uses of Stems.** The food obtained from the stems of plants is of great importance to man and animal. Cane sugar and molasses and maple sugar and syrup are produced by the stems of the sugar cane and maple tree; potatoes and onions are underground stems; rhubarb, asparagus, celery and other vegetables are aërial stems; syrup is derived from cornstalks, which also are an important food of horses and cattle. The fleshy stems of the prickly pear cactus of the thornless variety are another valuable cattle food, and many wild animals, such as the deer, moose and rabbit, browse on the twigs and stems of numerous plants. Common starch is derived from the potato, and sago is made from the starchy pith of the trunk of the palm tree. Perhaps most important of all has been the employment of the wood of trees for building purposes. W.F.R.

**STENCIL,** *sten'sil,* a thin sheet of metal, cardboard or leather with a pattern cut out by means of interrupted lines or dots. It is used in reproducing letters and designs. The stencil is placed on the surface or material to be ornamented, and a brush or sponge wet with ink or paint is passed over it. Packing boxes are often marked with stencils, and coats and dresses are sometimes ornamented by stenciling. The process is also employed in wall decorations of a high class.

**STEPHEN,** *ste'ven* (about 1097-1154), a king of England, whose reign, lasting from 1135 to 1154, was one of the darkest in English history. He was the third son of Stephen, Count of Blois, and Adela, daughter of William the Conqueror, and was a nephew of Henry I of England. In return for taking an oath to secure the succession of Matilda, the king's daughter, he was given large estates in Nor-

mandy, as Prince William, the rightful heir, was drowned in the *White Ship* while coming overseas. On the death of King Henry in 1135, Stephen hastened from Normandy to England, laid claim to the throne and was crowned king in Westminster Abbey. After Matilda, with her half-brother, the Earl of Gloucester, landed in England, revolts broke out, Stephen was imprisoned and Matilda acknowledged queen. The war was renewed and lasted for nearly seventeen years, plunging England into misery. Peace was made in 1153, by which Stephen was to retain the kingdom until his death, but was to be succeeded by Matilda's son, Henry of Anjou, first of the Plantagenet line. See HENRY [England].

**STEPHENS,** ALEXANDER HAMILTON (1812-1883), an American lawyer and statesman and Vice-President of the Confederate States of America. He was born near Crawfordsville, Ga. Stephens entered Franklin College, now the University of Georgia, with the view of becoming a minister, an educational society defraying his expenses. In 1834 he passed a law examination, was admitted to the bar and also taught school to repay his helpers for his education. From 1836 to 1842 he was a member of the state legislature. He was strongly opposed to secession in 1861, but remained loyal to his state when Georgia seceded. Stephens was elected to the Provisional Congress, and was later chosen Vice-President of the new government, but was often at variance with President Davis on questions of states' rights.

ALEXANDER H. STEPHENS
One of the great leaders of the Confederate States of America from 1860 to the end of the War of Secession.

In February, 1865, he headed the unsuccessful peace commission which conferred with President Lincoln at Hampton Roads (see HAMPTON ROADS CONFERENCE). He left Richmond before the war ended, and after the downfall of the Confederacy was arrested and imprisoned for six months at Fort Warren, in Boston harbor. In 1866 he was elected to the United States Senate, but was not permitted to take his seat, so he turned his attention to writing the first volume of his *War Between the States*. Being in reduced circumstances, he taught law classes in 1871, and also served as editor of the Atlanta *Sun,* which was published chiefly to defeat Horace Greeley for the Presidency. He was elected governor of Georgia in 1882 by 60,000 majority, but died before the end of his term.

Consult Trent's *Southern Statesmen of the Old Régime.*

**STEPHENSON,** *ste'venson,* the family name of two British engineers, father and son, both of whom made valuable contributions to the development of England's railway system.

**George Stephenson** (1781-1848), the elder Stephenson, won the name of "founder of railways." He was born at Wylam, near Newcastle. After working on a farm he assisted his father as fireman in a colliery. His interest in original research lead to his invention of a miner's safety lamp and to working out the idea of applying steam power to locomotive engines. His principle was concretely illustrated in a locomotive engine that was set to work in 1814 to operate on a colliery tramway. An improved engine was completed the following year and continues, with Watt's steam engine, to serve as the present-day model in locomotive construction.

GEORGE STEPHENSON
The first "railroad man."

Stephenson was appointed chief engineer of the Stockton & Darlington Railway in 1821, and three years later engineer of the Liverpool & Manchester Railway, which was formally opened in 1830 (see RAILROAD). This railroad purchased his famous, yet crude, locomotive, *The Rocket,* which attained the then amazing speed of twenty-nine miles per hour. Before long his reputation was so great that he was consulted on every large engineering project of his time. The opening of the Liverpool & Manchester Railway was a triumph for him, for it had been attended with many difficulties, and its success marked the real beginning of the British railway system.

**Robert Stephenson** (1803-1859), the son of George Stephenson, was born at Wallington Quay and died in London. He received an excellent education and on leaving school at-

tended science classes at the University of Edinburgh. He assisted his father in railway surveying and in 1824 went to South America to take charge of mining operations. After a prolonged absence he returned to England to assist his father in the building of the locomotive known as *The Rocket,* which won a prize of £500 ($2,500) offered for the best railway engine. He afterwards became chief engineer on the construction of the first railway to enter London, known then as the London & Birmingham Railway.

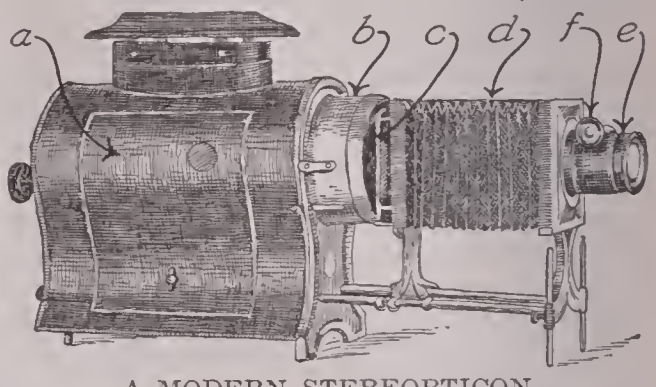
Robert Stephenson is, however, chiefly noted for the engineering genius shown in the great bridges and viaducts constructed by him. He was the inventor of the tubular bridge, of which the two most striking examples are those across the River Conway and the Menai Straits in Wales. He also introduced the use of tubular girders in the construction of iron bridges. The high-level bridge at Newcastle and the Victoria Bridge across the Saint Lawrence River at Montreal rank among the most notable of his engineering achievements.

He began early to show indications of the engineering genius inherited from his father, but his taste led him into the field of construction of railways rather than into the making of railway engines. He visited Germany, Switzerland and many other parts of Europe, also Canada, Egypt and India, for the purpose of building railways in those countries. Taking considerable interest in the political affairs of his country, he was elected a member of Parliament for Whitby, Yorkshire. B.M.W.

Consult Smiles' *Lives of the Engineers.*

**STEPPES,** *steps,* the Russian name for the extensive, treeless lands extending from Southeastern Europe along the borders of the Caspian Sea to the Altai Mountains in Central Asia. As there is little moisture, farming without irrigation is impossible, although just northwest of this region lies the vast "black earth" plain, the best agricultural section of Russia, where enormous quantities of grain are raised. During the spring, when the rains start the grass growing, great herds of cattle, sheep and horses may be seen grazing, but they are soon led to better pasturage by the wandering tribes of Tartars, for the summer droughts dry up the lands. The great plains of Western North America and the treeless plains, or *pampas,* of Argentina are also steppes.

**STEREOPTICON,** *ster e op' ti kon,* an apparatus for projecting on a white surface a magnified image of a picture. The principal parts of the apparatus are the lantern, or box for enclosing the light, the condenser, the objective and the light. The lantern box, which is usually made of sheet iron of the best quality, has openings at the top and bottom to provide




A MODERN STEREOPTICON

(*a*) Enclosing lantern
(*b*) Lens and condenser
(*c*) Transparent slide
(*d*) Bellows for lengthening or shortening
(*e*) Combination of lenses
(*f*) Screw to manipulate bellows

thorough ventilation. A door on the side next to the operator gives ready access to the light. The condenser consists of a large, double-convex lens (see LENS), or, more frequently, of two plano-convex lenses with their curved surfaces facing each other. The purpose of the condenser is to gather the rays of light and throw them upon the picture to be projected. The objective consists of two double-convex lenses mounted in a tube of the right length to enable each lens to aid in magnifying the picture. This tube is mounted in a frame with a rack and pinion, enabling the operator so to adjust the focus of the objective to the condenser as to get a sharp definition of the picture on the screen.

**The Light.** Various devices are used for illuminating stereopticon pictures. That in most general use, and the most satisfactory where large pictures are required, is the electric arc light, in which the carbons are arranged at right angles. This gives a strong, even white light, but its manipulation requires some skill. Single lanterns are on the market which use an incandescent light that can be operated by connecting it with an ordinary electric light attachment. For use in small rooms requiring a picture of medium size these lanterns are very satisfactory. They can also be used with a battery of dry cells and are well adapted to schools and halls in rural communities. Acetylene gas and the oxyhydrogen limelight are also in use, but they have virtually been replaced by the electric light because of its greater convenience.

**The Screen.** The screen should have a plain white surface perfectly flat and free from wrinkles. Lecture rooms are usually fitted with a white wall for a screen. Heavy muslin hemmed and bound with cord, so that it can be tightly stretched, makes a very satisfactory screen, and screens of this sort are in general use.

**The Slides.** The pictures generally used in stereopticons are photographs on glass and are known as slides. The American slide is 4x3¼ inches, the English slide 3¼ inches square. They may or may not be colored by hand. Since the perfection of colored photography, beautiful slides are made by that process (see PHOTOGRAPHY, subhead *Color Photography*). Because the lens inverts the picture the slide must be inverted in the lantern to have it appear erect upon the screen.

**Dissolving Views.** The dissolving view effect is produced by a double lantern with the objectives so adjusted that each covers the same field on the screen, and by an attachment which gradually shuts off the light from one picture as it is turned on the other. In the hands of a skilful operator very pleasing effects are produced. W.F.R.

Consult Gage's *Optic Projection;* Norton's *The Lantern and How to Use It;* Tennant's *Coloring Lantern Slides.*

**STEREOSCOPE,** *ster'e o skohp,* an instrument through whose lenses photographs are transformed into pictures that are quite lifelike, with an effect of depth and distance and solidity ordinarily possessed only by actual scenes and objects. The first stereoscope was invented in 1838 by Sir Charles Wheatstone in England, but the instrument which came into common use was an improved and simplified model which was developed by Sir David Brewster. Oliver Wendell Holmes, in the United States, brought out still another model, based on the same principle as Brewster's machine but much changed in appearance.

The principle of the stereoscope is comparatively simple. It must be remembered that the eyes of a human being may be compared to cameras; each eye reproduces a separate picture, and the brain combines them into one. Because the eyes are some distance apart, the pictures reproduced are not exactly alike. Each eye sees more of one side of a given object than does the other; together, the two eyes see farther around the sides of an object than can one eye alone. This is what gives objects the effect of standing out from their backgrounds. In a stereoscope the eyes see, through lenses, two separate photographs, exactly alike, but differing to just the degree that the actual scenes would have differed when seen by the eye. These two photographs, which are placed in a rack and arranged so that each eye sees only one, are combined by the brain into one picture, which gives the lifelike effect.

In taking stereoscopic pictures, one camera with two lenses is commonly used, although two separate cameras would, of course, serve the same purpose. Theoretically, the lenses should be placed exactly as far apart as are the human eyes, but in practice it is found more satisfactory to increase the distance, thereby securing an effect of greater depth and distance.

Not many years ago nearly every family possessed a stereoscope, and it occupied with its pictures a prominent place on the parlor table. The popularity of the device has decreased with the advent of moving pictures and of books with halftone illustrations. A.C.

**STEREOTYPING,** *ster'e o type ing.* A stereotype is a plate made of type metal and used in printing. The process of making such a plate is known as *stereotyping.* The type is set and locked into forms. The face of the type is then brushed over with a brush containing a small quantity of oil. A pulp consisting of a mixture of clay and papier-mâché is then pressed down on the forms so that a perfect impression of the face of each type is made in the pulp. Next, the form is placed in a chamber and baked until the pulp is dry and hard, when it is taken from the type. This mold, or *matrix,* as it is called, is then ready for the stereotype plate, which is made by placing the matrix in a box face up and pouring melted type metal over it. This hardens at once, forming a solid plate of type metal, and from this the page is printed. Plaster of Paris or clay may be used for the matrix, but papier-mâché is in general use.

Plates for use on small presses are flat, but those used on the rotary presses on which daily papers are printed are in the form of a half cylinder (see PRINTING PRESS). Stereotype plates are inexpensive and can be quickly made, the time required being about fifteen minutes. They are specially adapted to newspaper work. A number of plates can be made from the same matrix, and in all large cities there are firms that make a specialty of supplying country newspapers with a part of their subject matter in this way (see NEWSPAPER). The use of the stereotype is now limited to printing

newspapers and the cheapest editions of books. For work of a higher grade the stereotype has been replaced by the electrotype. See ELECTROTYPING.

**STERNE,** *sturn,* LAURENCE (1713-1768), an English author who had a distinct part in the development of the novel as a form of literature. He was born at Clonmel, Ireland, and as his father was an officer in the army, the boy's early years were spent in traveling from place to place with the regiment. In 1736 he was graduated from Cambridge, and two years later was ordained and given a pastorate in Yorkshire. There he lived for twenty years, performing the duties of a country clergyman and delighting in the works of the old humorists and romancers. With the publication of the first two volumes of *Tristram Shandy* in 1759 his seclusion ended, for at once the book became very popular and the author was much in demand in London society. Seven other volumes of the work appeared within the next eight years, and Sterne's popularity increased. A journey on the Continent in 1765 resulted in *A Sentimental Journey through France and Italy,* which became the book of the moment in England, France and Germany. Sterne lived but a month after its publication.

These two works, his only ones except a volume of sermons and some letters, have the fault of the time in which they were written, which did not demand delicacy in its authors. The sentimentality, too, seems obvious and overdone to a present-day reader; but the merits of the books are no less positive than their faults. Humor pervades the pages, and the easy, rambling style fits excellently the content. More important than all else, Sterne was a real creator of character, and some of the figures from his writings, notably Uncle Toby, from *Tristram Shandy,* will live as long as English is read.

**STETHOSCOPE,** *steth'o skohp,* a device used by physicians in examining the heart and lungs. Tests are made by listening to the sounds of these organs, as irregularities indicate certain diseases (see HEART, subhead *Sounds of the Heart*). The simplest type of this instrument is a wooden tube about a foot long, hollow through the center and widening out at one end into a bell-shaped flange, which is placed against the chest. The other end is provided with an earpiece. A later device is equipped with two earpieces, joined to the chestpiece by rubber tubes. An instrument on the same order, but much more delicate, is known as a *phonendoscope.* It is a shallow, metal cup having attached to it two rubber ear tubes and a small rod ending in a button, the latter being placed against the chest. When the sounds must be determined with great exactness this instrument is considered preferable to the stethoscope.

**STETTIN,** *steh teen',* one of the chief centers of German shipbuilding, and the capital of the Prussian province of Pomerania. It is situated on both sides of the Oder, eighty-three miles northeast of Berlin. Stettin is one of the foremost ports of Germany and is an important station on the route to the Baltic and Scandinavia. Because of the rapid development of German shipbuilding and the effort to make the empire a great maritime country, the city is growing rapidly, and it now possesses some of the largest dockyards in the empire.

Stettin carries on a vast trade in wood, corn, petroleum, wine and fish, and is the seat of extensive industries, including the manufacture of clothing, sugar, chemicals and machinery. The clothing industry alone gives employment to more than 10,000 workers. The places of greatest interest are the Municipal Museum, the town hall, the churches of Saint Peter and Saint James, and the old Ducal Palace. The latter is a sixteenth-century structure with modern renovations, and it now contains the law courts and government offices. Population in 1910, 236,113.

**STETTLER,** *stet'ler,* a town in Central Alberta, the distributing point for a prosperous mixed-farming region. It is served by the Lacombe branch of the Canadian Pacific Railway and by two branches of the Canadian Northern. It lies slightly east of a straight line between Calgary and Edmonton, and is 105 miles south of Edmonton and 154 miles north of Calgary by rail. Camrose is fifty-seven miles north and Red Deer is about forty miles west of Stettler. Population in 1911, 1,444; in 1916, estimated, 2,000.

The important manufacturing establishments of Stettler are a flour mill, with a daily capacity of 100 barrels, and a cigar factory employing about a hundred hands. The storage and shipment of grain and the distribution of farm implements are the important branches of trade. Fishing and shooting in the vicinity are good, and Buffalo Lake, twelve miles north, is a favorite summer resort. Stettler owns and operates its waterworks and electric-lighting plant. The town was founded about 1901, and was named for one of the early settlers.

**STEUBEN,** *stu'ben,* Frederick William Augustus, Baron von (1730-1794), a brave German soldier who sailed to America during the Revolutionary War to aid the colonial forces. When Steuben offered his services to Congress he was a veteran of two European wars, with a thorough knowledge of military tactics, and Washington made good use of him, sending him to Valley Forge immediately to drill the raw colonial troops and establish an efficient military régime. As soon as he had the troops in one section trained, he was transferred to another section to "collect, organize and discipline" more recruits. After the war he spent the rest of his life in the United States. New York, Virginia, Pennsylvania and New Jersey gave him grants of land for his services, and Congress voted him a gold-hilted sword and a pension of $2,400.

BARON STEUBEN

**STEUBENVILLE,** *stu'ben vil,* Ohio, the county seat of Jefferson County, is on the west bank of the Ohio River near the place where the river becomes the eastern state boundary. It is forty miles west and south of Pittsburgh and twenty-three miles north of Wheeling, and is on the Pennsylvania, the Pittsburgh, Cincinnati, Chicago & Saint Louis and the Wheeling & Lake Erie railroads and electric interurban lines. The area exceeds three square miles. The population, which in 1910 was 22,391, had increased to 27,445 in 1916 (Federal estimate). Prominent features of the city are the city hall, courthouse, public library, Gill Hospital and parks.

The surrounding country is a fertile agricultural section, and the natural wealth of the vicinity includes large deposits of coal, which is extensively mined, petroleum, natural gas, clay and quarries of fine building stone. Iron and steel works, foundries and machine shops, and manufactories of pottery, paper, tin plate, glass and glassware are the leading industrial plants. Fort Steuben was built in 1787. The town was planned in 1798 and it received a city charter in 1851.

**STEVENS,** *ste'venz,* Thaddeus (1792-1868), an American statesman, orator and leader in Congress, one of the most aggressive of the antislavery leaders. He was born at Danville, Vt., was graduated at Dartmouth College in 1814, and for a time taught school at York, Pa. Later he studied law and began practice in Gettysburg. He served in the state legislature and in the constitutional convention, and in 1848 and again in 1850 was elected to Congress, where he was a strong opponent of the fugitive slave laws, the Kansas-Nebraska Bill and all other measures favorable to Southern interests. In 1858 he was again elected to Congress, becoming the acknowledged leader of the House and Chairman of the Ways and Means Committee. He was bitterly hostile to the seceding states and was a pronounced advocate of emancipation and the enfranchisement of the negro. In 1868, in a speech in Congress, he proposed the impeachment of President Johnson, and was one of the committee named to prepare the articles of impeachment.

**STEVENSON,** *ste'ven son,* Adlai Ewing (1835-1914), an American statesman, Vice-President of the United States during Cleveland's second administration. He was born in Christian County, Ky., and was educated at Centre College, in the same state. After completing a course in law he was admitted to the bar in 1857 and began practice in Illinois. Having become active in the state Democratic party, he was elected to Congress in 1874. After the election of President Cleveland he was appointed first assistant Postmaster-General, and in 1892 was elected Vice-President of the United States on the ticket with Grover Cleveland. On the expiration of his term Stevenson was appointed a member of the American commission on the adoption of international bimetallism. He was again a nominee for the Vice-Presidency in 1900, on the ticket with William J. Bryan, but failed of election. In 1908 he was the Democratic nominee for governor in Illinois, but was defeated by Deneen. His chief published work was a book of political reminiscences.

**STEVENSON,** Robert (1772-1850), a Scotch engineer who built the famous Bell Rock lighthouse, overcoming what would almost appear insurmountable difficulties, was born at Glasgow.

Being appointed engineer and superintendent of Scottish lighthouses, he earnestly devoted himself to the task of rendering navigation more safe. He erected twenty-three lighthouses on the coasts of Great Britain, and was the inventor of the flash or intermittent light now universally adopted.

Stevenson's father died during his infancy and his mother married Thomas Smith, the chief engineer of the Lighthouse Board. This accounts for the trend of his inclination and abilities which led to his succeeding to his stepfather's position in 1796.

On one of his tours of inspection as chief engineer Stevenson was accompanied by Sir Walter Scott, who describes the famous Bell Rock lighthouse in his diary. In addition to his great work in behalf of safe navigation, Stevenson was widely consulted on construction of roads, bridges, harbors, canals and railways. He died in Edinburgh.

**STEVENSON,** Robert Louis Balfour (1850-1894), a Scottish essayist, poet and writer of fiction, born in Edinburgh, November 13, 1850, of a well-to-do family. His father was a civil engineer, and the son showed much interest in that profession, which he was not robust enough to adopt. He studied at the University of Edinburgh, though his work was constantly interrupted by ill health, received a training in law, and was admitted to the bar in 1875. However, he turned from law to literature, and in 1878 published *An Inland Voyage,* in which is described a canoeing journey in France and Belgium. Critics recognized at once the charm of the young writer's style, but the public gave the graceful sketch little attention. In the following year he published *Travels with a Donkey,* the material for which had been furnished by a trip through Southern France.

ROBERT LOUIS STEVENSON

**His Marriage.** In 1876 he had met Mrs. Osbourne, the lady who afterward became his wife, and in 1879 he learned that she was ill in California. Deeply alarmed, he set out at once on the trip across the Atlantic. As travel was expensive and his means were small, he went as a steerage passenger, and crossed the Continent on an immigrant train; and of these experiences he made use in *The Amateur Emigrant* and *Across the Plains.* Arrived in San Francisco he married Mrs. Osbourne, and after some months spent in a desolate mining camp, returned with her and her son Lloyd to Scotland. His health, always far from robust, had suffered severely from the strain of his journey and his anxiety, and the years following his marriage were wandering ones, spent in search of strength.

**His Great Work.** In spite of the ill health that would have daunted a less courageous man and the unfavorable conditions made unavoidable by his constant traveling, Stevenson produced between 1880 and 1888 two collections of delightful essays, *Virginibus Puerisque* and *Familiar Studies of Men and Books;* a volume of fanciful and entertaining stories, the *New Arabian Nights;* the very popular *Treasure Island; Prince Otto,* a pleasing romance; *Dr. Jekyll and Mr. Hyde; Kidnapped,* an excellent and widely read story of Scotch life, and two collections of poems, *Underwoods* and *A Child's Garden of Verses,* the latter of which reveals a remarkably sympathetic understanding of child life. These little poems seem not merely poems to a child or for a child, but by a child; and they show in delightful fashion what must have been the pleasures of Stevenson's lonely childhood.

**Sought Far for Health.** In 1888, still in search of health, Stevenson went with his family to Samoa, in the South Seas, where he remained until his death. His home, at the foot of Mount Vaea, he christened Vailima, and his work in superintending the building and improvement of it was a delight to him. He acquired great influence with the natives, and took an active interest in their politics, attending councils, where he sat in state. The most notable of his productions during this later period were *The Master of Ballantrae,* another story of Scotch life; *David Balfour,* a sequel to *Kidnapped,* and the uncompleted romances *St. Ives* and *Weir of Hermiston,* this latter regarded by many critics as Stevenson's greatest work. He died December 3, 1894, of apoplexy, and the next day sixty natives carried his body to the summit of Mount Vaea, where he was buried.

**His Place in Literature.** Stevenson is one of the most fascinating personalities in the history of English literature, largely because of the courage which helped him to work diligently, uncomplainingly and even cheerfully in the face of great difficulties. Those who knew him personally found it hard to judge fairly of the writer because of the charm which the man exerted. He ranks high, however, by reason of his artistic, delicately wrought style and his

power as a romance writer, second not even to that of Scott. The charm of his first romance, *Treasure Island*, with its unfailing fascination for young and old, is aptly set forth in these lines of Bert Leston Taylor's:

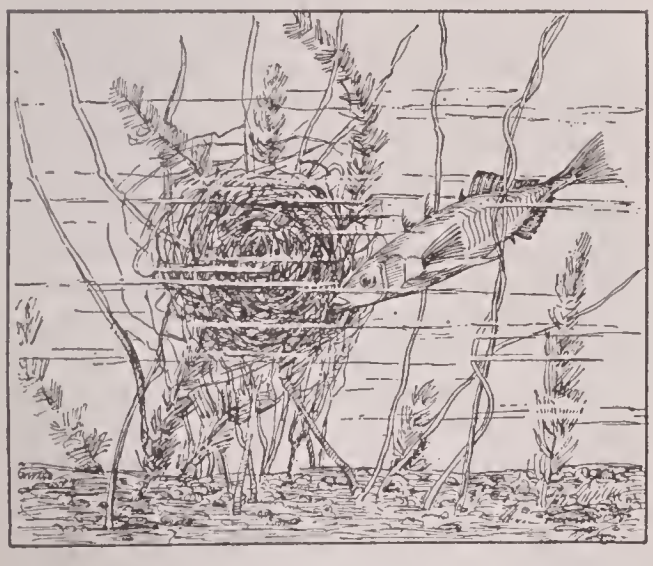
Comes little lady, a book in hand,
A light in her eyes that I understand,
And her cheeks aglow from the faery breeze
That sweeps across the uncharted seas.
She gives me the book, and her word of praise
A ton of critical thought outweighs.
"I've finished it, daddie!"—a sigh thereat.
"Are there any more books in the world like that?"

No, little lady, I grieve to say
That of all the books in the world to-day
There's not another that's quite the same
As this magic book with the magic name.
Volumes there be that are pure delight,
Ancient and yellowed, or new and bright;
But—little and thin, or big and fat—
There are no more books in the world like that.

A.MC C.

Consult Swinnerton's *Robert Louis Stevenson: A Critical Study;* Raleigh's *Stevenson.*

**STICKLEBACK,** *stik''l bak,* a group of small fishes of the northern hemisphere, so called because certain of the fins are replaced by strong, sharp spines. Instead of having scales the body usually possesses a series of hard plates. There



STICKLEBACK AND ITS NEST

are both fresh-water and ocean species, the former attaining a length of from two to four inches, and the latter, of not more than seven. These fish have the peculiar habit of building muff-shaped nests of sticks and roots for receiving the spawn. The male carefully guards the spawn, and he also watches over the young for several days after the eggs are hatched. Sticklebacks feed upon aquatic insects and worms.

**STICK'SEED,** a tall, hairy-stemmed weed of the borage family, so named because its fruit, a small, dry nut, has rows of sharp bristles that stick to the clothing of people and to the fur or hair of animals. The plant grows in dry soil quite generally throughout North America, from the Mexican border northwards. It has slender branches, gray-green leaves and small blue, white or lavender flowers. The stickseed is a persistent weed, and can be eradicated only by patient digging and cultivation of the ground.

**STIKINE,** *stik een',* **RIVER,** a North American stream which has been for many years the chief avenue from the Pacific Ocean into the interior of Northern British Columbia. The Stikine flows into the Pacific Ocean through the narrow strip of Alaska soil which shuts off a large part of British Columbia from the sea. It rises in Canada, on the west slope of the Cassiar Mountains, in British Columbia, and describes an irregular semicircle in its course, running first northward, then westward, and finally curving gradually to the south. The river is 335 miles long, and drains a basin of approximately 20,000 square miles. In summer there is steamer service on the river as far as Telegraph Creek, 170 miles from its mouth.

**STILL'WATER,** Minn., the county seat of Washington County, is on the Saint Croix River, which forms the southeastern state boundary, eighteen miles northeast of Saint Paul. In the surrounding lake region are a number of pleasure resorts. The city is served by river boats and by the Northern Pacific, the Chicago, Saint Paul, Minneapolis & Omaha and the Chicago, Milwaukee & Saint Paul railroads. In 1910 the population was 10,198. The area of the city is three and one-half square miles. Stillwater has a Federal building, a courthouse, an auditorium, a Carnegie Library and a city hospital, and manufactories of threshers, tractors, clothing, sash, doors, woodwork, boots and shoes and twine. Its lumber interests are important. It is the seat of the Minnesota state prison. The place was settled in 1840 and became a city in 1854. The commission form of government was adopted in 1916.

**STILT,** a wading bird having long, slender legs which give it the odd appearance of walking on stilts. The birds are found throughout the warmer parts of both hemispheres, but the only North American species is the *black-necked stilt,* which ranges from Oregon southward. It is a handsomely-marked bird about fifteen inches long, with white under parts,

black upper parts and bright red legs. It builds its nest by lining a slight depression in the ground with grasses. The eggs are three or four in number and are of an olive or buffy color, thickly spotted with chocolate tones. The bird frequents shallow ponds in fresh and salt marshes, and feeds on water insects.

**STILTS.** Every one is familiar with the long walking sticks with foot rests, used by boys in their play, which enable them to cover the ground with very long steps. It is interesting to know that in some sections of Europe, particularly in Belgium and France, the peasants use stilts regularly when the lands are flooded. These practical stilts are strapped securely about the leg below the knee, and the walker uses a long pole to help him maintain his balance.

**STING RAY,** a group of ray fish whose most striking characteristic is the possession of a long, flexible tail with sharp spines near the base, which have cutting teeth along the edges. With this tail, which is a veritable dagger, painful wounds can be inflicted. The sting ray has a flat, disklike body, and large specimens are sometimes ten or twelve feet long. There are about fifty species; the fish occur most abundantly in tropical seas.

**STOCK,** Capital. What is known in the business world as *capital* is the money, lands, buildings, equipment, etc., invested in a commercial enterprise. If only two or three people share in such an investment the company is usually a *partnership,* and the evidence of each partner's share in the business is contained in a partnership agreement. If, however, the business is large and the capital is a sum so great that many partners are required, an arrangement so simple is not possible. In such event a *corporation* is formed, and the capital is divided into small sums called *shares.*

Each share may be in face value any sum determined upon—$10, $25, $50, $100, or even more. The usual amount in great enterprises is $100. Since 1916 some states, notably New York, permit corporations to issue stock without assigned value. Each investor, when he puts money into the enterprise, receives a certificate from the company. This states that he is a *stockholder* to the extent of the number of shares named in the certificate; naturally, this paper is called a *certificate of stock,* or a *stock certificate.*

A certificate of stock does not specify what the owner pays for it. One share whose face value is $100 may have cost just that sum; if so, it was bought *at par.* Just to the degree that the corporation is prosperous or is a losing concern the stock sells at prices above or below par. Many people with faith in the future of a somewhat discredited enterprise will buy stock when it is quoted far below par, and will hold it for a long time, confident that changes of fortune will make it a highly valuable investment.

*Dividends* are sums distributed to stockholders from the profits of the enterprise, and are always based on the par value of the shares. A dividend on stock may be compared to interest on a loan, except that the former is uncertain, while interest is always a fixed sum. If stock pays six per cent in a certain year, the dividend is $6 on each $100 share; if some holders purchased their stock at 50 (one-half par value), the return on their investment is twelve per cent; if they paid 120 (one-fifth above par), the actual income from their stock is five per cent.

Capital stock in most companies is not assessable to meet losses which the business may incur; in others the shareholders may be assessed when the board of directors considers it necessary. An assessment adds to the original cost of the stock to the holder.

Every stockholder is a partner in the business, though he is not so called. As a partner he has the right to vote for those men, also shareholders, who shall give of their time to the oversight of the enterprise. Such managers form the *board of directors.* This board is directly responsible to the investors for the conduct of affairs, and it is given the privilege of choosing the officers in whose hands responsibility of management rests. The officers—president, vice-president, secretary, treasurer, etc.—are responsible to the board. In elections to the board of directors each man's voting power is proportionate to the number of shares he owns. If one man owns fifty-one per cent of the stock he can outvote all other members combined and control elections; this is fair to all, as his investment is largest and he has most at stake. Any stockholder who objects thus to the power of one man need not remain a member of the corporation; he may dispose of his stock as soon as a buyer can be found. E.D.F.

Consult Cook's *Treatise on the Law of Corporations.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

Commerce
Corporation
Partnership
Stock Exchange

**STOCK EXCHANGE,** an association of men who buy and sell stocks of railroads and other great industrial enterprises. The name is also applied to the building in which the association conducts its business. The same reasons which justify the existence of a board of trade (which see) may be applied to a stock exchange. When a man wishes to buy or sell shares of a certain stock there should be some convenient place where the transaction may be made. Many years ago, in London, before regular stock exchanges existed, a man desiring to purchase or dispose of stocks went to a well-known coffeehouse (somewhat like a modern restaurant); he knew that brokers, well informed in such business, were in the habit of congregating there, and for a small commission one of them would act as his agent in the transaction. In 1801 these brokers organized a buying and selling association and called themselves, appropriately, a stock exchange.

**How Exchanges Became Stable.** In the development of such a business many alterations in policy were inevitable. The early exchanges executed commissions in connection with any kind of stock that existed; there was no discrimination between the shares of strong, conservative enterprises and those which were of doubtful value. Finding it to be against public policy to recognize questionable stock and give it official approval equally with that which had proved value, stock exchanges eventually began to limit the number of enterprises whose shares should be recognized. Today a "listed" stock is one which is dealt in on the stock exchanges; so far as the exchanges are concerned any stock they do not list as entitled to their recognition does not exist. Before a company's stock can be listed its officials must satisfy the exchange that it has paid-up capital, that it is a legitimate enterprise and that it is in good financial condition. A balance sheet of the company is carefully scrutinized by the board of control of the exchange; then the stock is listed or the application is rejected.

It will be noted at once that many stocks are quoted on the exchanges every day at prices which mark them as extremely undesirable, if not almost worthless. Such a condition did not exist when they were first admitted to the exchange lists; circumstances which possibly could not have been avoided, may have lessened the earning power and thus lowered the price people are willing to pay for shares. Prosperous times or more intelligent management may advance values, or suspicion may force them still lower, but in justice to hundreds of innocent holders of stock the shares remain listed, so their market value may at all times be known.

If a company is able to pay four or five per cent on its capitalization per year its stock sells on the exchanges at about its face value, or *at par*. If its earning power increases until it can pay eight or ten per cent a year people are willing to pay more than face value; purchased even at a premium the investor will get a good income. So great is the earning power of some corporations that their stock is worth from $500 to $900 for every $100 share, but should disaster overtake them and little hope exist that prosperity would return again those same shares might sell for $10 each. In 1916 the Bethlehem Steel Company made excessive profits from the manufacture of war munitions; people were so anxious to purchase its stock that the price advanced for a time to $575 per share. The Standard Oil Company's stock for many years has been quoted at from $600 to $900 per share.

In illustrating the functions of exchanges stocks only have been mentioned. In addition, stock exchanges now deal in the bonds of corporations whose stock they list, although they have not always done so. For many years the New York Stock Exchange limited its activities solely to railroad stocks and bonds.

All great daily papers, in their market reports, print quotations and sales of stocks and bonds. Young people will learn much of value if they consult these lists frequently. They serve somewhat as a business barometer. Soon, with the help of the news columns of the papers, one will be able to know why certain stocks are high and others are low.

**Memberships.** Because an exchange limits its membership practically to the number of men who can easily care for the business within its sphere of influence, memberships have become worth large sums of money. Their value depends in a large measure upon the prevailing state of business and the market level of securities. The lowest price of a seat on the New York Exchange in a decade was $20,000, in 1896, during a period of national depression; the highest price was $95,000, in 1905 and 1906. A seat on the Boston Exchange does not vary greatly from $16,000; Montreal, $20,000; those of Saint Louis, Chicago, Baltimore, Philadelphia and other market centers, from $1,500 to $5,000.

No man can purchase a membership and thereby become entitled to the privileges of his exchange; he must be formally recommended and then elected. If a member dies his membership becomes the property of his heirs, but such transfer does not carry membership rights. The new owner must be elected to a seat or the membership must be sold and the purchaser must secure election. If on a member's death he is indebted to other members of his exchange the proceeds of the sale of his seat must first be applied to the cancellation of debts; any sum remaining belongs to the beneficiary.

**The "Curb."** How are unlisted stocks and bonds marketed, and how are their prices known and regulated, if stock exchanges refuse to recognize them? There are scores of companies whose unlisted stocks are on the market, and there is an immense amount of trading in them, in spite of their highly speculative character.

Such purchases and sales are made by what is known as *curb trading,* and the place where they are made is literally *the curb*—the sidewalk and the street, into which traders overflow. If brokers and customers are barred from the stock exchange, they resort to the nearest satisfactory device and gather outside the exchange, or as near to it as possible, on the curb. Here sales and purchases are made very much as they are on the floor of the exchange. Sometimes there is a wildly gesticulating crowd of a thousand men on the curb in New York City. Daily papers in the great cities report these transactions as fully as they do those on the exchanges. The "curb" is a recognized institution in New York, London and Paris. E.D.F.

Consult Van Antwerp's *The Stock Exchange from Within;* Campbell's *The Law of Stock Brokers.*

**Related Subjects.** The following articles in these volumes should be read in connection with the above:

| | |
|---|---|
| Board of Trade | Capital |
| Bucketshop | Corporation |

**STOCK'HOLM,** the capital and metropolis of Sweden and the chief industrial center of that country. It is picturesquely situated on both shores of Lake Mälar at the point where the lake is drained by a small stream into a channel of the Baltic Sea (see map, following page 2092). A part of the city occupies a network of islands and peninsulas, and for this reason it is sometimes called the "Venice of the North." Yet there is nothing else about this interesting capital, with its characteristic northern scenery, its rocky hills and virgin forests, to suggest the tranquil beauty of an Italian city. The old nucleus of Stockholm, called the *Staden,* which is built on an island in the stream, is a place of narrow, winding streets and quaint gabled houses, but the sections on the north and south shores of the mainland have broad, modern avenues, and many handsome squares, promenades, parks and public buildings.

Stockholm is an educational center of importance, though it has no state university. There is an excellent system of elementary schools and there are several higher technical institutions. The Royal Library contains a great collection of books, manuscripts and pamphlets, numbering approximately a million and a half, and there are museums of fine arts, antiquities, ethnology and archaeology, natural history and biology, many scientific and historical academies and an astronomical observatory. Near the observatory are the offices for the distribution of the Nobel Prizes (which see). Stockholm ranks next to Gothenburg in amount of shipping clearing the harbor, and has numerous manufacturing establishments. The manufactures include beer, sugar, cotton goods, tobacco products, furniture, soap, foodstuffs and other commodities. Shipbuilding is an industry of importance. The city was founded by Birger Jarl in 1250. Population in 1910, 342,323; in 1915, estimated to be 386,270.

**STOCK'TON,** Francis Richard (1834-1902), a popular American writer of humorous stories, called by a contemporary admirer a "wonderful weaver of fancies" and—

> "A King of the Kingdom of Laughter
> And a Prince, but never of Wails."

The stories of Frank Stockton, as he is usually called, are enjoyed for their whimsical humor, unusual characters and situations, and attractive style. Their author spent his early life in his native city of Philadelphia. Although he showed literary ability by writing verses at the age of ten, and by contributions to his high school paper, he became a wood engraver and designer after completing school. He began his professional literary work in 1866, when he became a reporter on the Philadelphia *Morning Post.* Later he joined the staffs of the *Hearth and Home* and *Scribner's Monthly* of New York, and in 1873 became assistant editor of *Saint Nicholas.*

After seven years of editorial work Stockton began to write independently. In 1874 prob-

ably his most popular story, *Rudder Grange,* appeared, and firmly established his fame among American humorists. Among other stories are *The Lady or the Tiger?* his best-known short tale, which has been translated into several other languages; *The Christmas Wreck and Other Stories; The Casting Away of Mrs. Lecks and Mrs. Aleshine,* and its sequel, *The Dusantes; The Beeman of Orn; The Hundredth Man; Pomona's Travels; The Adventures of Captain Horn; Mrs. Clipp's Yacht; Afloat and Ashore; The Girl at Cobhurst,* and *Ting-a-Ling Stories,* a collection of tales for children.

FRANK R. STOCKTON

When he wrote *The Lady or the Tiger?* he created a situation the like of which probably never confronted any other author. He could not bring the story to a close because he was unable to decide whether the lady or the tiger should come through the doorway.

After 1899 he lived at Claymont, in the Shenandoah Valley, near Charlestown, W. Va., an estate formerly owned by the Washingtons and planned by the first President of the United States. He died at Washington, D. C.

**STOCK'TON,** CAL., the metropolis and county seat of San Joaquin County, located seventy-eight miles east of San Francisco and forty-eight miles southeast of Sacramento. A canal two and one-half miles long extends from the center of the city to the San Joaquin River, furnishing a water route of eighty-five miles to San Francisco. Railroads entering the city are the Atchison, Topeka & Santa Fe, the Southern Pacific, the Western Pacific, the Stockton Terminal & Eastern and the Tidewater Southern. Electric interurban service extends north and south. The population was 23,253 in 1910 and 35,358 in 1916 (Federal estimate). The area exceeds four square miles.

Prominent features of the city include a Federal building erected at a cost of $142,190, Hazleton Public Library, the Western Normal School, Saint Agnes Academy, a state hospital for the insane, a county hospital, Saint Joseph's Home, Dameron Hospital and several bank buildings. Within the city are ten parks, each a block in size, and at the outskirts is a park of twenty-seven acres. Along the canal within the city limits are warehouses, shipyards, lumber yards and flour mills. Steamers sail daily between Stockton and San Francisco, and water commerce is extensive. Stockton is the principal market of this great central valley, a section of grain fields, orchards and vineyards, sheep and cattle farms and dairies. The city has large grain, hay and produce warehouses, and contains important manufactories of harvesters, traction engines, disk harrows and other agricultural machinery, window glass, woolen goods, mining machinery, wheat starch, macaroni, olive oil, wine, leather and canned goods. Each year Stockton sends to market large quantities of general merchandise and agricultural produce, of which the most important items are grain and millstuff, barley, beans and potatoes.

Stockton was settled in 1847 by Capt. C. M. Weber, on a grant of land secured from the Mexican government. Stock raising was at first the only industry, but with the discovery of gold in the Sierra Nevada Mountains the settlement became an important supply station. Boats were used to facilitate trade with San Francisco, and with the agricultural development of the valley Stockton grew as a commercial and manufacturing center. It became a city in 1850 and was named in honor of Robert Field Stockton of the American navy. The commission plan of government was adopted in 1911. N.F.DE E.

**STODDARD,** *stod'ard,* RICHARD HENRY (1825-1903), an American poet, essayist and critic, born at Hingham, Mass., the son of a sea captain. While he was still a boy the family moved to New York, and he attended the public school there, later studying law. After working for a time in a newspaper office he learned the trade of a blacksmith and then that of an iron molder, at which he worked for several years. In 1849 he produced a volume of poems, *Footprints,* and from that time published frequently either prose or verse. From 1853 to 1870 he had a place in the New York customhouse, and from 1880 until his death was literary editor of the *Mail and Express,* a New York evening paper. His works include *Songs of Summer, The King's Bell, The Book of the East* and *Under the Evening Lamp,* besides biographies, juvenile books and editions of the works of other poets. Stoddard was a true poet, and his imaginative power at times equals that of any other American poet. Delicacy and sincerity are the chief characteristics of his work, and some of his lyric poems

are worthy of wide reading because of their appeal to the highest emotions.

**STOICISM,** *sto'i siz'm,* belief in the doctrines of Zeno, who was called "the Stoic philosopher," because he gave his lectures in a public porch, called *stoa* in Greek.

Zeno founded his school of philosophy in the latter part of the fourth century B. C. Its teachings were lofty and severe. At a time when the followers of Epicurus were telling the people of Athens that pleasure is the chief end of existence, the Stoics taught *virtue,* for its own sake, as the highest good. They believed in the freedom of the will, in a single divinity, in self-control, courage, temperance and justice, and in repressing all emotion arising from pain or misfortune. One of their doctrines that is embodied in many a modern political creed was that every human being is part of the same "world soul"—a *universal brotherhood* that should dwarf all difference of rank and nationality.

The Stoic philosophy made a strong appeal to the Romans, and Epictetus became the founder of the New Stoic school, to which belonged also such great thinkers as Seneca, Cicero and Marcus Aurelius, "the flower of Stoicism." It has had a marked influence on the thought of the world; it helped to prepare the world for the acceptance of Christianity.

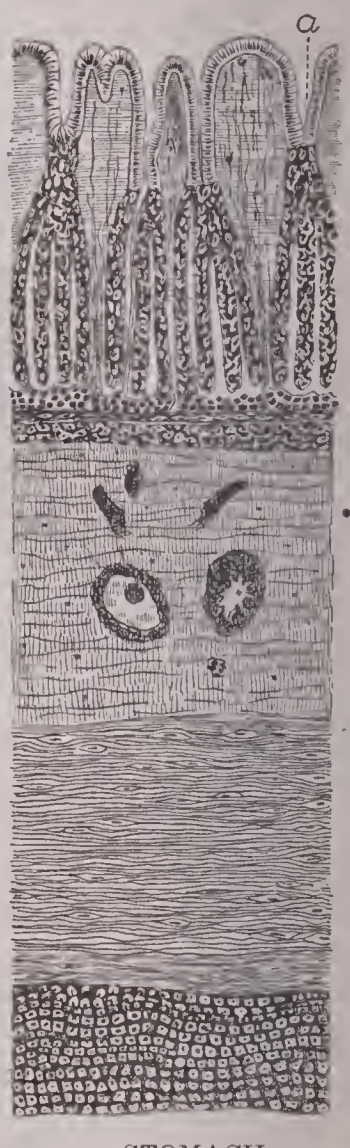
Consult Gomperz' *A History of Ancient Philosophy;* Davidson's *The Stoic Creed.*

**Related Subjects.** In connection with this discussion of Stoicism, the reader is referred to the following articles in these volumes:

Epictetus
Epicurus
Philosophy
Seneca
Zeno

**STO'LA,** the characteristic garment of the Roman matrons, worn over the tunic. It was very full, and was gathered in at the waist by a girdle, falling in soft folds to the ankles or feet. The stola was frequently ornamented at the throat by a Grecian or colored border, and was fastened at the shoulder by a fibula, or ornamental brooch. To complete the Roman costume, the palla, a loose mantle, was draped over the stola in a shawl-like effect. To women who had been divorced from their husbands, the wearing of the stola was forbidden by law. See TUNIC.

**STOMACH,** *stum'uk,* a muscular, elastic bag, constituting one of the most important organs of digestion. It lies crosswise in the abdominal cavity, beneath the diaphragm and between the liver and the spleen (see illustration, page 7). The stomach, which is really an enlargement of the alimentary canal, is cone-shaped and curves upward at both ends. At the upper left side it opens into the oesophagus, or gullet, and at the right end, which is the narrowest part, it opens into the small intestine (see illustration, page 1796). The opening between the stomach and small intestine is known as the *pyloric orifice.* Under moderate distension the stomach is twelve inches in length and four inches across at the widest part. It then holds about three pints.




STOMACH
Diagrammatic section through coats of stomach, highly magnified.
(*a*) Duct of gastric gland
(*b*) Mucous membrane
(*c*) Muscular coat of mucous membrane
(*d*) Submucous coat
(*e*) Circular muscles
(*f*) Longitudinal muscles

Digestion takes place in this organ through the secretion of *gastric juice.* This is a yellowish fluid consisting of water, salts, mucus, hydrochloric acid and the ferments *pepsin* and *rennin.* Gastric juice is secreted by numerous glands in the mucous membrane which forms the inside lining of the stomach. Next to this lining there is a submucous coat which binds the mucous membrane down to a muscular coat. The latter contains circular longitudinal muscle fibers. These relax and contract and by their movements cause the food to be thoroughly mixed with gastric juice. The outer layer of the stomach is formed of serous membrane.

Abuse of the stomach is the source of many ills to which the human race is subject. For suggestions about proper eating habits, see the articles LIFE EXTENSION and HEALTH HABITS.

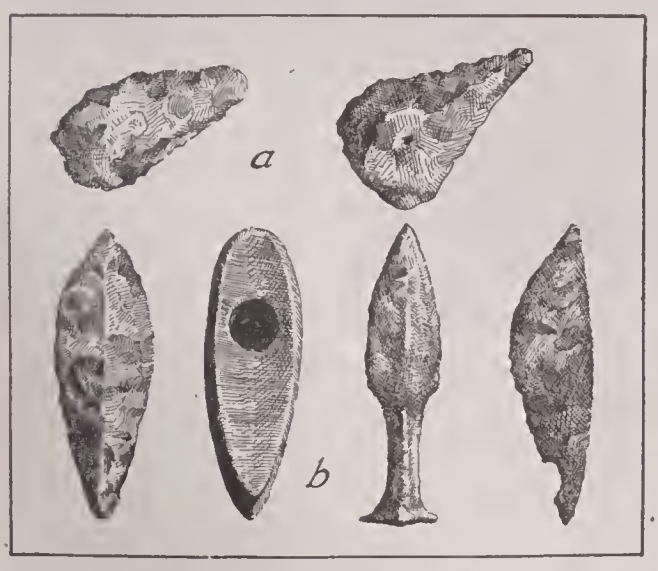
**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Abdomen | Intestine |
| Alimentary Canal | Pepsin |
| Digestion | |

**STONE.** See Rock.

**STONE AGE,** a period in the history of a people when they knew nothing of metals, but used weapons and instruments made of stone, bone and horn. There are people in remote regions to-day who are still in their Stone Age —savages of the South Seas, Eskimos of the Polar regions—who use only the implements of the era long passed by enlightened people. In Europe men emerged from the Stone Age many thousands of years ago, when animals now extinct roamed the forests—the mammoth, the woolly rhinoceros, the cave lion and the cave bear. In Asia and in Africa the Stone Age came still earlier. All that is known of these people of other ages is learned from the relics that are found in caves and river gravel and burial mounds. There are axes and axhammers, knives, daggers, spear tips and arrowheads, saws and chisels, the earliest ones of chipped flint, the later ones of polished stone. Carved bits of bone and horn are found with them and sometimes very crude pottery. These people cultivated the ground and had domestic animals; those who lived on the seacoast had boats and fishing lines.

Scientists divide the Stone Age into two divisions—the *Paleolithic* and the *Neolithic*




FLINT AND STONE IMPLEMENTS

These were among man's earliest weapons. (*a*) Specimens of the Paleolithic period; (*b*) of the Neolithic period.

periods. The former corresponds roughly to the geologic past, and is sometimes called the "age of chipped stone." The Neolithic is the period of highly finished stone implements.

Stanley Waterloo has written a fascinating book called *The Story of Ab,* in which he describes the life of a boy in the Stone Age. Consult Osborn's *Men of the Stone Age.*

**Related Subjects.** In this connection the following articles in these volumes provide helpful material:

| | |
|---|---|
| Age | Human Period |
| Bronze Age | Iron Age |

**STONECHAT,** a small European bird of the warbler family, taking its name from its peculiar note, a sound like that of two pebbles struck together. It is restless and active in habits and is usually found in open, grassy lo-

THE STONECHAT

cations, where it builds its nest on the ground, under a tuft of grass. The eggs are four to six in number, of a greenish-blue color, faintly spotted. The bird migrates in winter to Africa. It feeds on insect larvae, worms, beetles and seeds. The stonechat is the blue titmouse of Ireland.

**STONEHENGE,** *stone'henj,* an impressive prehistoric monument, now in ruins, consisting of a group of huge, roughhewn stones. Stonehenge is on Salisbury Plain, in Wiltshire, England, a mile and a half from Amesbury. Some of the stones have been carried away to make bridges and milldams, and the structure has also been worn down by time, but scientists, who have found the ruin a subject of absorbing interest, agree that originally it was arranged according to the following plan: The entire monument was surrounded by a circular earthwork, 300 feet in diameter. Within were two concentric circles of standing stones, the

outer circle, which consisted of thirty stones, being 100 feet in diameter. Forty smaller stones made up the inner circle. Within these circles were two other sets of stones, one row within the other and each forming a horseshoe with the opening toward the northeast. Near the central curve of the inner horseshoe, and across a northeast-southwest axis line, was the so-called altar stone, a flat block of blue marble fifteen feet in length. The arrangement of this stone, and of two others placed on a line with it, seem to indicate that they were used to determine the time of the summer solstice. Most authorities think, from this, that Stonehenge was connected with the worship of the sun.

PLAN OF STONEHENGE

At the left, as the stones originally stood; at right, as they now lie, strewn about by the hand of time.

STONEHENGE TO-DAY

One scientist, by calculating the day on which the midsummer sun rose exactly on a line with the axis of the structure, figured that Stonehenge was erected in 1680 B. C. It is supposed that the structure was also used as a temple for consecrating the dead.

THE CONFEDERATE MEMORIAL

Above is a view of Stone Mountain. Beneath is a specimen of the carving. Mounted officers and foot soldiers will be carved in relief almost the entire length of the pile of granite, and will include recognizable images of all the great leaders of the Confederacy, both civil and military.

**STONE MOUNTAIN**, a huge, rounded mass of light gray, practically unblemished granite, about an hour's ride by automobile northeast of Atlanta, Ga. It is 800 feet high and 1,500 feet long. This great mound is to be transformed into a permanent memorial of the heroic struggle of the South during the War of Secession, by means of the most colossal piece of sculpturing ever undertaken. It is planned to chisel across its stony face, in bold relief, the figures of about 1,200 men, representing the army of the Confederacy. The figures will be between forty and fifty feet in height, and when the work is completed it will seem to the onlooker that an army of men, some mounted and some on foot, are marching across the face of the mountain. The plans call for lifelike representations of Lee, Stonewall Jackson and many others of the great Southern leaders. It is also planned to have a park surrounding the memorial, with paths and roads so arranged as to afford visitors effective positions from which to view the "army in gray."

The financial part of the undertaking is in charge of the Stone Mountain Confederate Memorial Association, at the head of which is the honorary president of the United Daughters of the Confederacy. Funds are being col-

lected for the monument both in the North and in the South. The work will be directed by the American sculptor, Gutzon Borglum; in his biography (page 842) will be found other details of the enterprise.

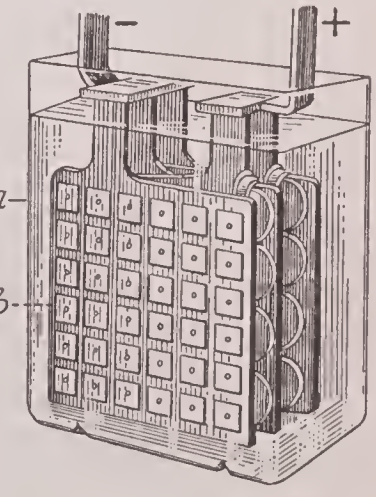
**STO'NER,** Winifred Sackville, a daughter of Lord Sackville of England, and a distinguished writer and teacher. She is the author of *Natural Education* and other educational books, and the founder of the Natural Education Schools. Mrs. Stoner is perhaps best known as the mother and teacher of Winifred Sackville Stoner, Jr., who as a child was generally believed to be further advanced in her intellectual development than anyone of her age in America. In her *Natural Education,* Mrs. Stoner describes the methods she employed in teaching her daughter. Elsewhere in these volumes (see article Education, subtitle *Natural Education,* page 1929), Mrs. Stoner presents briefly her educational creed.

In order to apply her principles and train teachers in her methods, she has founded natural-education schools in New York and one or two other cities. But as the wife of John B. Stoner, a surgeon in the United States Marine Service, she has been obliged to change her place of residence frequently according as Dr. Stoner has been transferred from one hospital to another, so she has not been able to give the continued personal attention to her schools necessary for their complete development. Mrs. Stoner is engaged in many charitable enterprises and political movements affecting the legal status of women in America. She has also devoted much time and energy to the promotion of the Esperanto language. Both her daughter and herself have written textbooks in this language, and have traveled around the world lecturing on behalf of its adoption. M.V.O'S.

**STONE'WALL,** a town in Manitoba and a residential suburb of Winnipeg, which lies twenty-one miles to the southeast. Stonewall and Winnipeg are connected by an electric line. The town is situated in a prosperous agricultural region in which also there are deposits of building stone, lime and gravel. The chief industrial establishments include grain elevators, lumberyards, a planing mill, stone quarries and limekilns. Stonewall is the seat of a collegiate institute. Population, 1,300.

**STONY POINT,** a town in Rockland County, New York, noted as the scene of one of the most brilliant exploits of the Revolutionary War. It is situated on the Hudson River at the head of Haverstraw Bay, forty-two miles north of New York City, and is built on a rocky promontory which the Americans fortified shortly after the struggle with England began. In May, 1779, the fort was captured by the English under Clinton, and a strong garrison was placed there. In July following, General "Mad Anthony" Wayne led an attacking expedition to recover the fort. The Americans advanced in two columns and surprised the British, who immediately opened fire. The Americans did not return the fire, but charged with bayonets so impetuously that the fort, with over 540 prisoners, was taken within thirty minutes. The Americans lost fifteen, the British, sixty-three. The site of the fortifications was acquired by the state in 1897 as a national reservation, and the ruins of the fort may still be seen. The summit contains a lighthouse and fog-bell tower. Population in 1910, 3,651.

**STORAGE BATTERY,** *stohr'ayj bat'er i.* The storage battery can be understood by anyone who will perform the following simple experiment: Connect four dry cells in series. With two wires connect two strips of lead to the terminals of the battery of dry cells. The lead strips should be at least one inch by four inches. Place the lead strips in a solution composed of one part of strong sulphuric acid to twenty parts of water. Bubbles of hydrogen will rise from one of the lead strips and a red coating will appear on the other. After a few minutes disconnect the dry cells and connect the lead strips to an electric bell. The bell will ring. A storage battery has been formed. The current from the dry cells has produced a chemical change on the lead plates, one of the plates becoming coated with an oxide of lead (lead peroxide), the other remaining pure lead.



A STORAGE BATTERY
(*a*) Case; (*b*) grids.

These two plates, one lead, the other lead peroxide, with the sulphuric acid, form a battery which acts like any other electric battery. The acid acts more rapidly on the oxide of lead than it does on the lead. When the two plates are connected by an electrical conductor this chemical action produces an electric cur-

rent. It is *chemical energy* which is stored in a storage battery. When the proper electrical connections are made this chemical energy is transformed into *electrical energy*. When the battery is run down it is in the same condition as at first; that is, in the simple storage cell described above the lead peroxide has been reduced to lead, so both plates are again lead. The storage battery may be charged and discharged as often as desired.

The difference between a storage battery and other electric batteries is that in all other batteries new solution and new positive plates must be supplied when the battery is run down, while in the storage battery the plates and the solution are renewed by passing an electric current through the battery from some other source.

The plates of commercial storage cells are usually in the form of *grids*. The apertures in the positive plate are filled with lead peroxide and those of the negative plate with porous lead. When the cell is discharged both plates consist of monoxide of lead.

In the Edison storage battery the plates are formed of grids of sheet steel. The grids of the plates which form the positive electrode are filled with nickel hydroxide; the plates forming the negative electrode are filled with an oxide of iron (ferrous oxide) mixed with graphite. The liquid is a solution of caustic potash (potassium hydroxide). The merit of the Edison battery lies in the fact that it will stand without injury severe usage which would destroy a lead battery. It has greater capacity in ampere hours in proportion to weight than a lead battery. The voltage of the Edison battery is about 1.6 volts for each cell, while the voltage of a lead battery is two volts for each cell.

Storage batteries are used for various purposes, but chiefly to furnish power for electric automobiles. These batteries are charged by connecting them with a strong electric current for a few hours. Most garages are equipped to charge storage batteries. E.E.B.

Consult Treadwell's *The Storage Battery;* Watson's *Storage Batteries: Their Theory, Construction and Use.*

**Related Subjects.** The reader is referred to the following articles in these volumes:
Edison, Thomas A. (page 1926)
Electric Bell
Electricity
Voltmeter

**STORK,** *stawrk,* a long-legged, strong-winged bird, of large size, finding its food in marshes and swamps, but often nesting on roofs and chimneys, in close proximity to the dwellings of man. It feeds on eels, frogs and toads, reptiles, young birds and small mammals. This bird belongs to the heron family. The best-known species is the *white stork,* found in summer

THE WHITE STORK

throughout most of Europe and Central Asia, and migrating for the winter to Africa and Northern India. This stork has pure white plumage with black wing coverts and quills, a red beak and reddish-pink legs and feet. The pairs return year after year to the same nests, building on to it till it is several feet in height. The eggs are white in color and three to five in number.

Other storks of the eastern hemisphere are the *Japanese stork,* the *black stork,* the *white-necked stork* and the *adjutant.* In South America are found the *maquari stork* and the *jabiru,* a bird five feet high, occurring as far north as Texas. The stork has no voice and can only chatter by striking together the parts of its strong beak.

Much folklore has grown up about the bird, and it is protected and venerated in many sections, especially in Germany and the Netherlands, not only for its usefulness in destroying insects, reptiles, etc., but also as a bird of good omen and the symbol of domestic affection. From its loving care for its young has come the familiar legend that the stork brings the new baby into the home.

**STORMS,** disturbances of the atmosphere, marked usually by violent winds, rain, snow or hail, or by a combination of two or more of these. If the temperature of the air were everywhere equal, storms would be unknown. But the sun warms the air unevenly; its heat-

ing action is greatest at the equator and is least at the poles. Heated air expands, the upper layers flowing off into the surrounding regions, cooling as they go. This reduces the atmospheric pressure over the warm areas and increases it elsewhere. Air on the lower levels is thus driven into the center of low pressure, and a rotary circulation on a vast scale is maintained, by the action of the sun's heat and the pull of gravitation on the atmospheric envelope.

Storms are known as *general* and *local*. The former alone are described here. Such storms may cover a low pressure area having a diameter of from 500 to 1,000 miles, but they are not often violent. They are accompanied by shifting winds and more or less rain or snow. Technically they are known as *cyclones,* or *cyclonic storms,* but they must not be confused with the so-called cyclones of the Mississippi Valley, which are really tornadoes. Storms which occur in areas of high pressure rather than of low pressure are given the name of *anti-cyclonic* storms.

Cyclonic storms of this nature have well-defined areas on nearly every continent. In North America they cover the great central region between the Rocky and the Appalachian mountains. They have an almost uniform progress from west to east, and it usually requires eight or ten days for one to make a complete circle. For this reason storms and fair weather succeed each other at frequent intervals. This regularity of movement makes it possible for the Weather Bureau to foretell the approach of these storms from twenty-four to thirty-six hours in advance.

The approach of storms in summer is heralded by an area of low pressure. A light southerly wind prevails. The sky becomes hazy or streaked with clouds. The temperature rises; the air becomes uncomfortably humid; local thunderstorms may occur. Whether rain falls or not, the temperature continues to rise until the center of low pressure passes, when the wind shifts to the west or northwest and a welcome coolness ensues, with a drop of ten or twenty degrees in temperature. The center of the cyclonic area is marked by rain which results from the rapid condensation of vapor in the cooling clouds. Such are the characteristic phenomena of a summer storm in the Mississippi Valley.

Storms are most frequent in the spring and fall months, and are more frequent in winter than in summer. They attain their maximum violence over the sea, where the wind often blows with such velocity as to be a menace to shipping. Their average duration is about three days, but they may continue for as many as ten days.

Though few people enjoy stormy weather, storms are a necessity. Without them we would be deprived of rain or snow and of that variation of temperature so essential to the maintenance of health and assurance of good crops on the farms.

Consult Bigelow's *Storms, Storm Tracks and Weather Forecasting* (United States Weather Bureau Bulletin 20); Bowie and Weightman's *Types of Storms of the United States and Their Average Movements.*

**Related Subjects.** More detailed information as to the causes and character of storms will be found in the following articles:

| | |
|---|---|
| Blizzard | Rain |
| Cyclone | Snow |
| Hail | Tornado |
| Hurricane | Typhoon |
| Lightning | Weather Bureau |
| Monsoon | Whirlwind |
| Norther | Wind |

**STORY,** *sto'ri,* JOSEPH (1779-1845), an Associate Justice of the United States Supreme Court, whose term was one of the longest in the history of that body. He was born at Marblehead, Mass., graduated at Harvard in 1798, and three years later began the practice of law. Always much interested in literature, he published in 1804 a volume of poems, *The Power of Solitude;* but these were unsuccessful, and he made no future attempt in the field of poetry. His success in his profession was immediate, however, and he became active in politics, serving in the state legislature and in 1808-1809 in the national Congress, where he became known as a leader of the Republican (afterward Democratic) party. President Madison appointed him an Associate Justice of the Supreme Court in 1811, and he served for thirty-four years, exercising an important influence in American constitutional law. The only other Justice except Chief Justice Marshall who served so long was John Maynard Harlan. The most celebrated case on which Justice Story wrote the decision was the Dartmouth College Case. From 1829 until his death Justice Story was professor of law at Harvard, and his reputation as a teacher rivaled that as a jurist. His publications include *Commentaries on the Law of Bailments, Commentaries on the Constitution of the United States, Commentaries on Equity Jurisprudence* and *Conflict of Laws.*

**STORY-TELLING.** Children have always known that there is nothing in the world more delightful than a good story, well told, but grown people had forgotten the fact for many, many centuries. Time was, in the younger days of the world, when kings and warriors knew no higher pleasure than listening to tales about brave men and beautiful women, but when books became common the story-tellers lost their hold on their audiences, and gradually the art of story-telling was almost lost. Mothers, to be sure, still told tales to their children in the firelight, but the wider phases were almost unknown.

In very recent years, however, there has been a rebirth of the ancient art. Not only do mothers and teachers make constant use of it, but professional story-tellers delight men and women as well as children with this new-old form of entertainment.

**The Purposes of Story-Telling.** The child, with his incessant demand for stories and "just one more" story, has but one idea in mind—to be amused and entertained. The mother or teacher who makes use of stories for other purposes must therefore bear one fact in mind: unless the story is interesting the child will not listen; and if he does not listen, the other purposes are defeated at the outset. The first, great purpose of story-telling, then, must be to entertain. Nor need this be looked upon as an unworthy aim. The picture, the statue, the poem exist to give joy, and the story is but another means for appealing to the love for the beautiful.

But story-telling may and does accomplish other things. It may be made, without developing an unpleasantly aggressive moral character, to teach lessons of thoughtfulness, of patriotism and of faith. In fact, the story furnishes so surely the easiest and most direct road to the child's heart and conscience that one wonders how the mother who cannot or will not tell her children stories ever teaches them any moral lessons.

Then, too, story-telling develops the imagination. There is little danger that, as some parents fear, the child's imagination will be overdeveloped by the use of fairy tales or myths; the danger is far greater that, without these aids, the imagination will be totally undeveloped, and the person will live always in the valleys and never on the mountain tops where imagination gives him the right and the ability to live.

From the teacher's point of view it is of the utmost importance that a love for nature, for history, for many of the works of the great authors may be awakened by means of stories. This does not mean that the pupils should be given their nature study, their history or their literature all in the form of stories; these should be merely the introduction, the appetizer which stimulates a desire for the more solid things.

Other purposes may be mentioned hastily. Powers of concentration are strengthened by listening to stories; the vocabulary is increased and the foundations of an easy, grammatical English style are laid unconsciously. A child's comprehension and sympathies are broadened, too, and he is brought into contact with lives spent amid entirely different surroundings from his own.

**How to Choose a Story.** Of course the purpose for which a story is told influences to a certain extent the choice; but there are certain qualities which every story must possess if it is to fulfil any purpose. Older people may listen, through courtesy, to things in which they are not interested, but the child has no conscience on this matter—he listens only to what is so interesting that it holds his attention in spite of himself.

First of all, the story must have action, from beginning to end, and all the action must point to one definite conclusion. Explanations, long descriptions, "preaching" have no place in a story. Frequently a practiced story-teller can see in some tale overburdened with these undesirable elements a basis of action which is just what she wants, and can prune away all that retards this action. This one principle cannot be too strongly emphasized—the action need

not be particularly exciting, but there must be something happening all the time.

Much depends, too, on the beginning of the story. It must be direct and simple, and must locate the story at once in the child's mind. This does not mean that a definite situation is necessary—the familiar "once upon a time" or "in a wonderful far-off country" answers all requirements, but the hearer must not be left to "flounder." Introductory matter, unless of the very briefest, should be omitted. Unless the child's attention is held from the very first word, it is difficult to gain later.

No less important is the ending. Stories for grown-ups may present a "section of life," with no solution of the problems raised, no definite rounding-out of the lives of the characters, but children will tolerate no such halfway measures. Everything must be settled, once and for all, before the curtain falls. And the child is perfectly correct, from his own point of view, in demanding a happy ending. He has an innate feeling of justice which tells him that good people should be rewarded and bad people punished, and unless the story works out in that way, there is something wrong with the story. He knows nothing of the complicated ethics of later years, which finds it difficult to separate right from wrong.

One other point is worth remembering. The story must have "points of contact" with the children's expériences; that is, it must present images of familiar objects, though these may be placed amid unfamiliar surroundings or tinged with mystery. The children, for instance, have never seen a princess; but as the story proceeds it is evident after all that a princess is only a little girl who has to mind her father and mother, just as they have to mind their father and mother. There is enough difference to lend interest, but enough similarity to make comprehension possible.

It is found by story-tellers everywhere that children have a particular fondness for repetition of phrases or sentences within the stories. In the nonsense tale of *Epaminondas and His Auntie,* for instance, Mother's "Epaminondas, you ain't got the sense you was born with" never fails to evoke a delighted grin at every repetition. There seems to be a charm in coming across, in the midst of the newness, a phrase or sentence that has been heard before. Of course repetition is not really necessary to a successful story, but it is highly desirable.

The story-teller should remember, too, that the vocabulary of the children and their ability to use English are certain to be influenced by the stories to which they listen so absorbedly, and she should choose only such as have a pleasing English style. They need not, in fact should not, be in formal, bookish English, but they should make use of no expressions which the child may not safely adopt.

**How to Tell a Story.** The story may be told for the most excellent of purposes, and it may possess all the characteristics of the perfect tale, but if it is not well told it cannot fulfil its whole aim. This should not discourage anyone from attempting to tell stories, however, for while every one cannot be a natural story-teller with the real "gift," every one may learn to tell a story acceptably. Very much, of course, depends on the personality, but there are certain rules which, if followed, are certain to bring success. The actual telling is the dynamic, the creative, part of the story-teller's art—the part which can give her real joy, whether she have an audience of one or of one hundred.

*Know the Story Thoroughly.* This might seem an unnecessary warning, but the spectacle is painfully familiar of the story-teller who knows her material only fairly well and who finds it necessary to repeat, to go back and pick up dropped threads, to make explanations of points that should have been perfectly clear. The story should be so familiar that the teller does not have to think ahead, but can have her mind on each point as she brings it out.

This does not mean that the story should be memorized; indeed, the memorized tale is almost certain to sound more like a recitation than like a genuine "told" story. Nor does it mean that the same words must always be used. Probably there will be changes every time the story is told, but if there are any of those repetitions in which children delight, or conversations or specially favored passages, they should not be changed.

*Feel the Story.* If the story-teller, after careful study, feels that a certain story is dull or silly, she should not attempt to tell it, no matter how successfully others may have done so. In some way or other the teller's feeling in regard to the story communicates itself to the hearers, and they will not enjoy to the full a story which the teller is not enjoying.

*Be Natural.* Many people make a mistake in dealing with children by "talking down" to them or babying them. Children like to feel that the things that interest them are important enough to be dealt with in a grown-up

manner, and they resent passively, if not actively, the honeyed voice and the "Now my dear little children" attitude.

*Be Graphic.* The story-teller should have vividly before her mind the pictures in the story, and should present these as clearly and directly as possible. Too much thought of the words in which the story is being told works against this graphicness.

*Watch the Audience.* Anyone who watches her audience, particularly if that audience be composed of children, can tell instantly whether or not she is pressing her points home. If the eyes cling to hers and every expression of her face is mirrored unconsciously in theirs, she has no need to fear—she is in a fair way to become a successful story-teller and is going to enjoy her experiences.

*Will to Succeed.* There exists between the teller of the story and the listeners an unexplainable subtle connection which seems almost hypnotic. If the teller thoroughly enjoys a story herself and wills with all her might that her hearers shall enjoy it, she is likely to see a responsive, satisfied look appearing in the faces of the listeners. A.MC C.

## *Stories to Tell*

The following stories have all been found to appeal to children. They cover a wide range—the fable, the nature story, the supernatural tale—but they all possess that something which children love. The arrangement is by seasons—four for spring telling, three for summer, four for autumn and three for winter. At the close is given a supplementary list of stories, similarly grouped.

### SPRING STORIES

#### The Wind and the Sun

One spring day a dispute arose between the Wind and the Sun as to which was the stronger. As they were quarreling they saw a traveler walking along the road, with a great cloak thrown about his shoulders.

"Now we may make trial of our strength," declared the Wind; "let us both try with all our might, and the one who can compel the traveler to take off his coat shall be acknowledged the more powerful."

"Agreed," said the Sun. "Let the contest begin."

The Wind began by sending a furious blast that nearly snatched the coat away, but the shivering traveler clutched it the more tightly and drew it about him. The Wind puffed and tugged, and even brought a storm of rain and hail to help him, but the more it stormed, the more closely did the traveler wrap his cloak around him. Finally the Wind admitted that he could not get it away, and sank down, defeated.

Then the Sun took his turn. He drove away the clouds the Wind had scattered and shone with all his brightest beams on the man's shoulders. Hotter and hotter it grew until the traveler was really uncomfortable. He unfastened his coat, and then, as the sun never stopped shining, he threw it back, and finally took it off and ran hastily into the shade. The Sun had won by gentleness what the Wind could not win by force.

#### The Ugly Duckling

It was glorious in the country; it was summer; the cornfields were yellow, the oats were green, the hay had been put up in stacks in the green meadows, and the Stork went about on his long, red legs, and chattered Egyptian, for this was the language he had learned from his mother. All around the fields and meadows were great woods, and in the midst of these woods, deep lakes. Yes, it was right glorious in the country.

In the midst of the sunshine there lay an old farm, with deep canals about it; and from the wall down to the water grew great burdocks, so high that little children could stand upright under the tallest of them. It was just as wild there as in the deepest wood, and here sat a Duck upon her nest; she had to hatch her Ducklings; but she was almost tired out before the little ones came, and she seldom had visitors. The other ducks liked better to swim about in the canals than to run up to sit under a burdock and gabble with her.

At last one eggshell after another burst open. "Pip! pip!" each cried, and in all the eggs there were little things that stuck out their heads.

"Quack! quack!" said the Duck, and they all came quacking out as fast as they could, looking all around them under the green leaves; and the mother let them look as much as they liked, for green is good for the eye.

"How wide the world is!" said all the young ones; for they certainly had much more room now than when they were inside the eggs.

"D'ye think this is all the world?" said the mother. "That stretches far across the other side of the garden, quite into the parson's field; but I have never been there yet. I hope you are all together," and she stood up. "No, I have not all. The largest egg still lies there. How long is that to last? I am really tired of it." And so she sat down again.

"Well, how goes it?" asked an old Duck who had come to pay her a visit.

"It takes a long time for this one egg," said the Duck who sat there. "It will not open. Now, only look at the others! They are the prettiest little Ducks I ever saw. They are all like their father; the rogue, he never comes to see me."

"Let me see the egg which will not burst," said the old Duck. "You may be sure it is a turkey's egg. I was once cheated in that way, and had much care and trouble with the young ones, for they are afraid of the water. Must I say it to you? I could not make them go in. I quacked, and I clacked, but it was no use. Let

me see the egg. Yes, that's a turkey's egg. Let it lie there, and do you teach the other children to swim."

"I think I will sit on it a little longer," said the Duck. "I've sat so long now that I can sit a few days more."

"Just as you please," said the old Duck; and she went away.

At last the great egg burst. "Pip! pip!" said the little one, and crept forth. He was so big and ugly. The Duck looked at him.

"It's a very large Duckling," said she. "None of the others looks like that; it really must be a turkey chick! Well, we shall soon find out. Into the water shall he go even if I have to push him in."

The next day it was bright, beautiful weather; the sun shone on all the green burdocks. The Mother Duck with all her family went down to the canal. Splash! she jumped into the water. "Quack! quack!" she said, and one duckling after another plumped in. The water closed over their heads, but they came up in an instant, and swam off finely; their legs went of themselves, and they were all in the water; even the ugly gray Duckling swam with them.

"No, it's not a turkey," said she; "look how well he uses his legs, how straight he holds himself. It is my own child! On the whole, he's quite pretty, when one looks at him rightly. Quack! quack! come now with me, and I'll lead you out into the world, and present you in the duck yard; but keep close to me all the time, so that no one may tread on you, and look out for the cats."

And so they came into the duck yard. There was a terrible row going on in there, for two families were fighting about an eel's head, and so the cat got it.

"See, that's the way it goes in the world!" said the Mother Duck, and she whetted her beak, for she too wanted the eel's head. "Only use your legs," she said. "See that you can bustle about, and bend your necks before the old Duck yonder. She's the grandest of all here; she's of Spanish blood—that's why she's so fat; and do you see? she has a red rag around her leg; that's something very, very fine, and the greatest mark of honor a Duck can have; it means that one does not want to lose her, and that she's known by the animals and by men, too. Hurry! hurry!—don't turn in your toes; a well-brought-up Duck turns its toes quite out, just like father and mother—so! Now bend your necks and say 'Quack!'"

And they did so; but the other Ducks round about looked at them, and said quite boldly:

"Look there! now we're to have this crowd, too! as if there were not enough of us already! And—fie!—how that Duckling yonder looks; we won't stand that!" And at once one Duck flew at him and bit him in the neck.

"Let him alone," said the mother; "he is not doing anything to anyone."

"Yes, but he's too large and odd," said the Duck who had bitten him, "and so he must be put down."

"Those are pretty children the mother has," said the old Duck with the rag round her leg. "They're all pretty but that one; that is rather unlucky. I wish she could have that one over again."

"That cannot be done, my lady," said the Mother Duck. "He is not pretty, but he has a really good temper, and swims as well as any of the others; yes, I may even say it, a little better. I think he will grow up pretty; perhaps

"IF THE CAT WOULD ONLY CATCH YOU!"

in time he will grow a little smaller; he lay too long in the egg, and therefore he has not quite the right shape." And she pinched him in the neck, and smoothed his feathers. "Besides, he is a drake," she said, "and so it does not matter much. I think he will be very strong: he makes his way already."

"The other ducklings are graceful enough," said the old Duck. "Make yourself at home; and if you find an eel's head, you may bring it to me."

And now they were at home. But the poor Duckling who had crept last out of the egg, and looked so ugly, was bitten and pushed and made fun of, as much by the ducks as by the chickens.

"He is too big!" they all said. And the turkey cock, who had been born with spurs, and so thought he was an emperor, blew himself up, like a ship in full sail, and bore straight down upon him; then he gobbled and grew quite red in the face. The poor Duckling did not know where he dared stand or walk; he was quite unhappy because he looked ugly, and was the sport of the whole duck yard.

So it went on the first day; and then it grew worse and worse. The poor Duckling was hunted about by every one; even his brothers and sisters were quite angry with him, and said, "If the cat would only catch you, you ugly creature!" And the ducks bit him, and the chickens beat him, and

the girl who had to feed the poultry kicked at him with her foot.

Then he ran and flew over the fence, and the little birds in the bushes flew up in fear.

"That is because I am so ugly!" thought the Duckling; and he shut his eyes, but flew on farther; and so he came out into the great moor, where the Wild Ducks lived. Here he lay the whole night long, he was so tired and sad.

Toward morning the Wild Ducks flew up, and looked at their new mate.

"What sort of a one are you?" they asked; and the Duckling turned about to each, and bowed as well as he could. "You are really very ugly!" said the Wild Ducks. "But that is all the same to us, so long as you do not marry into our family."

Poor thing! he certainly did not think of marrying, and only dared ask leave to lie among the reeds and drink some of the swamp water.

There he lay two whole days; then came thither two Wild Geese, or more truly, two Wild Ganders. It was not long since each had crept out of an egg, and that's why they were so saucy.

"Listen, comrade," said one of them. "You're so ugly that I like you. Will you go with us, and become a bird of passage? Near here is another moor, where there are a few sweet, lovely Wild Geese, all unmarried, and all able to say 'Quack!' You've a chance of making your fortune, ugly as you are."

"Piff! paff!" sounded through the air; and both the Ganders fell down dead in the reeds, and the water became blood red. "Piff! paff!" it sounded again, and the whole flock of Wild Geese flew up from the reeds. And then there was another report. A great hunt was going on. The gunners lay around in the moor, and some were even sitting up in the branches of the trees, which spread far over the reeds. The blue smoke rose like clouds in among the dark trees, and hung over the water; and the hunting dogs came —splash, splash!—into the mud, and the rushes and reeds bent down on every side. That was a fright for the poor Duckling. He turned his head to put it under his wing; and at that very moment a frightful great dog stood close by the Duckling. His tongue hung far out of his mouth, and his eyes glared horribly. He put his nose close to the Duckling, showed his sharp teeth, and—splash, splash!—on he went without seizing it.

"Oh, Heaven be thanked!" sighed the Duckling. "I am so ugly that even the dog does not like to bite me!"

And so he lay quite quiet, while the shots rattled through the reeds and gun after gun was fired. At last, late in the day, all was still; but the poor little thing did not dare to rise up; he waited several hours still before he looked around, and then hurried away out of the moor as fast as he could. He ran on over field and meadow; there was a storm, so that he had hard work to get away.

Towards evening the Duckling came to a peasant's poor little hut; it was so tumbled down that it did not itself know on which side it should fall; and that's why it stood up. The storm whistled around the Duckling in such a way that he had to sit down to keep from blowing away; and the wind blew worse and worse. Then he noticed that one of the hinges of the door had given way, and the door hung so slanting that he could slip through the crack into the room; and that is what he did.

Here lived an old woman, with her Cat and her Hen. And the Cat, whom she called Sonnie, could arch his back and purr; he could even give out sparks; but for that, one had to stroke his fur the wrong way. The Hen had quite small, short legs, and therefore she was called Chicka-biddy Shortshanks; she laid good eggs, and the woman loved her as her own child.

In the morning they noticed at once the strange Duckling, and the Cat began to purr and the Hen to cluck.

"What's this?" said the woman, and looked all around; but she could not see well, therefore she thought the Duckling was a fat duck that had strayed. "This is a rare prize!" she said. "Now I shall have duck's eggs. I hope it is not a drake. We must try that."

And so the Duckling was taken on trial for three weeks, but no eggs came. And the Cat was master of the house, and the Hen was the lady, and always said "We and the world!" for they thought they were half the world, and by far the better half. It seemed to the Duckling that one might have another mind, but the Hen would not allow it.

"Can you lay eggs?"

"No."

"Then will you hold your tongue!"

And the Cat said, "Can you curve your back, and purr, and give out sparks?"

"No."

"Then you will please have no opinion of your own when sensible folks are speaking!"

And the Duckling sat in a corner and was in low spirits; then he began to think of the fresh air and the sunshine; and he was seized with such a strange longing to swim on the water that he could not help telling the Hen of it.

"What are you thinking of?" cried the Hen. "You have nothing to do, that's why you have these fancies. Lay eggs, or purr, and they will pass over."

"But it is so charming to swim in the water," said the Duckling, "so nice to feel it go over one's head, and to dive down to the bottom!"

"Yes, that's a fine thing, truly," said the Hen. "You are clean gone crazy. Ask the Cat about it—he's the cleverest thing I know—ask him if he likes to swim in the water, or to dive down: I won't speak about myself. Ask our mistress herself, the old woman; no one in the world knows more than she. Do you think she wants to swim, and to let the water close above her head?"

"You don't understand me," said the Duckling.

"We don't understand you! Then pray who is to understand you? You surely don't pretend to be cleverer than the Cat and the woman—I won't say anything of myself. Don't make a fool of yourself, child, and thank your Maker for all the good you have. Are you not come into a warm room, and have you not folks about you from whom you can learn something? But you are a goose, and it is not pleasant to have you about. You may believe me, I speak for your good. I

tell you things you won't like, and by that one may always know one's true friends! Only take care that you learn to lay eggs, or to purr and to give out sparks!"

"I think I will go out into the wide world," said the Duckling.

"Yes, do go," replied the Hen.

And so the Duckling went away. He swam on the water, and dived, but he was shunned by every creature because he was so ugly.

Now came the fall of the year. The leaves in the wood turned yellow and brown; the wind caught them so that they danced about, and up in the air it was very cold. The clouds hung low, heavy with hail and snowflakes, and on the fence stood the raven, crying, "Croak! croak!" for mere cold; yes, one could freeze fast if one thought about it.

One evening—the sun was just going down in fine style—there came a whole flock of great, handsome birds out of the bushes; they were shining white, with long, supple necks; they were swans. They uttered a very strange cry, spread forth their glorious great wings, and flew away from that cold region to warmer lands, to fair open lakes. They mounted so high, so high! and the ugly Duckling had such a strange feeling as he saw them! He turned round and round in the water like a wheel, stretched out his neck towards them, and uttered a cry, so high, so strange, that he feared as he heard it. Oh! he could not forget those beautiful, happy birds; and as soon as he could see them no longer, he dived down to the very bottom, and when he came up again, he was quite beside himself. He did not know what the birds were, nor where they were flying to; but he loved them more than he had ever loved anyone. He did not envy them at all. How could he think of wishing to have such loveliness as they had? He would have been glad if only the ducks would have let him be among them—the poor, ugly creature!

And the winter grew so cold, so cold! The Duckling had to swim about in the water, to keep it from freezing over; but every night the hole in which he swam about became smaller and smaller. It froze so hard that the icy cover sounded; and the Duckling had to use his legs all the time to keep the hole from freezing tight. At last he became worn out, and lay quite still, and thus froze fast in the ice.

Early in the morning a peasant came by, and found him there; he took his wooden shoe, broke the ice to pieces, and carried the Duckling home to his wife. Then the Duckling came to himself again. The children wanted to play with him; but he thought they wanted to hurt him, and in his terror he flew up into the milk pan, so that the milk spilled over into the room. The woman screamed and shook her hand in the air, at which the Duckling flew down into the tub where they kept the butter, and then into the meal barrel and out again. How he looked then! The woman screamed, and struck at him with the fire tongs; the children tumbled over one another as they tried to catch the Duckling; and they laughed and they screamed!—well was it that the door stood open, and the poor creature was able to slip out between the bushes into the newly-fallen snow. There he lay quite worn out.

But it would be too sad if I were to tell all the misery and care which the Duckling had to bear in the hard winter. He lay out on the moor among the reeds when the sun began to shine again and the larks to sing; it was a beautiful spring.

Then all at once the Duckling could flap his wings: they beat the air more strongly than before, and bore him stoutly away; and before he well knew it, he found himself in a great garden, where the elder trees stood in flower, and bent their long, green branches down to the winding canal, and the lilacs smelt sweet. Oh, here it was beautiful, fresh, and springlike! and from the thicket came three glorious white swans: they rustled their wings, and sat lightly on the water. The Duckling knew the splendid creatures, and felt a strange sadness, such as he had never known before.

"I will fly away to them, to the royal birds! and they will beat me, because I, that am so ugly, dare to come near them. But it is all the same. Better to be killed by them than to be chased by ducks, and beaten by fowls, and pushed about by the girl who takes care of the poultry yard, and to suffer hunger in winter!" And he flew out into the water, and swam toward

NO LONGER UGLY AND HATEFUL TO LOOK UPON

the beautiful swans; these looked at him, and came sailing down upon him with outspread wings. "Kill me!" said the poor creature, and bent his head down upon the water, and waited for death. But what saw he in the clear water? He saw below him his own image; and, lo! it was no longer a clumsy, dark-gray bird, ugly and hateful to look at, but—a swan!

It matters nothing if one is born in a duck yard if one has only lain in a swan's egg.

He felt quite glad at all the need and hard times he had borne; now he could joy in his good luck, in all the brightness that was round him. And the great swans swam round him and stroked him with their beaks.

Into the garden came little children, who threw bread and corn into the water; and the youngest cried "There is a new one!" and the other children shouted, "Yes, a new one has come!" And they clapped their hands and danced about, and ran to their father and mother; and bread and cake were thrown into the water; and they all said, "The new one is the most beautiful of all! so young and so handsome!" and the old swans bowed their heads before him.

Then he felt quite ashamed and hid his head under his wings, for he did not know what to do; he was so happy, and yet not at all proud, for a good heart is never proud. He thought how he had been driven about and mocked and despised; and now he heard them all saying that he was the most beautiful of all beautiful birds. And the lilacs bent their branches straight down into the water before him, and the sun shone warm and mild. Then his wings rustled, he lifted his slender neck and cried from the depths of his heart:

"I never dreamed of so much happiness when I was the Ugly Duckling."

### The Three Butterflies

One morning there were three gay little butterflies, a red, a yellow and a white, playing in the garden in the sunshine. They danced happily from flower to flower and never grew tired at all. Presently a cloud slipped in front of the sun, and the garden grew gloomy, but still the red butterfly and the yellow butterfly and the white butterfly danced above the flowers. But when the rain began to fall and to wet their pretty, gauzy wings, they flew home. Alas! the door of their house was locked and they could not find the key.

Back to the garden they flew, and up to a tall, white lily. "Beautiful lily," they said, "let us creep into your flower so that the rain cannot hurt us." "I will take the white butterfly in," said the lily, "because she looks like me; the other ones I do not like." Then the white butterfly said, "If you will not shelter my sisters, I will not come in either." And the three butterflies flew away in the rain, dancing no longer, but looking very sad and sorry.

It rained harder and harder, and the three flew to a gay red and yellow tulip. "Open your blossom, tulip," they cried, "and let us slip in out of the rain." The tulip was haughty. "I will open for the red and yellow," it replied, "for they wear my colors; the white one I do not like." Then the red and yellow butterflies said, "If our sister may not come in, neither will we; it is better for us to get wet together than to desert one another," and they flew away.

Now the sun, back of his cloud curtain, had heard all that the butterflies said, and was pleased because they were so unselfish and loved one another. So he pushed his way through the clouds, drove away the rain, and made the garden sweet and bright again. The butterflies soon dried their wings in the sunshine, and danced happily above the flowers until night.

### Tikki-Tikki-Rimbo

A NONSENSE TALE FOR APRIL FOOL'S DAY

A farmer and his wife had two little children, and they were twins. The little girl was so bright and happy that they named her Joy, but the boy was a sulky, sullen fellow, and they named him Tikki-tikki-rimbo-rimbo-rimbo, tikki-tikki-rimbo-rimbo-rimbo, allamentapantico bonasco Schutz.

One day the children were playing out in the yard and Joy fell into the well. Tikki-Tikki-rimbo-rimbo-rimbo, tikki-tikki-rimbo-rimbo-rimbo, allamentapantico bonasco Schutz ran to his father and cried:

"Oh, father, Joy has fallen into the well!"

"What?" asked the father, who was deaf.

"Oh, father, Joy has fallen into the well!"

Then the father cried to the hired man and said:

"Fetch the ladder; Joy has fallen down the well."

And they ran as fast as they could, and put the long ladder down the well, and the father climbed down and brought up Joy, who was *very* wet, but not hurt at all.

The next day the children were playing out in the yard again, and Tikki-tikki-rimbo-rimbo-rimbo, tikki-tikki-rimbo-rimbo-rimbo, allamentapantico bonasco Schutz fell down the well. Joy ran to her father, crying—

"Oh, father, Tikki-tikki-rimbo-rimbo-rimbo, tikki-tikki-rimbo-rimbo-rimbo, allamentapantico bonasco Schutz has fallen into the well!"

"What did you say?" asked the father, who was *still* deaf.

"Oh, father," repeated Joy, "Tikki-tikki-rimbo-rimbo-rimbo, tikki-tikki-rimbo-rimbo-rimbo, allamentapantico bonasco Schutz has fallen into the well!"

Then the father called to the hired man and said:

"Fetch the ladder; Tikki-tikki-rimbo-rimbo-rimbo, tikki-tikki-rimbo-rimbo-rimbo, allamentapantico bonasco Schutz has fallen into the well!"

And they ran as fast as they could, and put the ladder down, but by the time they reached him poor little Tikki-tikki-rimbo-rimbo-rimbo, tikki-tikki-rimbo-rimbo-rimbo, allamentapantico bonasco Schutz was dead.

## SUMMER STORIES

### A Little Dutch Hero

Holland is a little country, but the Dutch children love it just as much as you love your great, big country. There are many curious things to be seen there—the wooden shoes and the windmills and the odd little caps and the far-reaching gardens of tulips; but the most curious of all are the dikes which hold back the sea. For Holland is lower than the ocean, and parts of it would be flooded every time the tide rises were it not for these great walls which the people have built.

Little Hans knew what a dreadful thing it would be if the sea ever pushed through these walls; and when he walked or played with his little brother along the dikes he used to tell him stories of how the sea tried and tried and tried to get into Holland, because Holland was so beautiful, and how the brave dikes kept it out.

One day Hans and his little brother had wandered in their playing very far from home—so far that Hans had grown tired, and climbed up on the dike to rest. The little brother was playing with stones at the foot of the dike. Suddenly he called out.

"Oh, Hans, what a funny little hole!"

"A hole," repeated Hans. "Where?"

"Right here," said the brother. "There's water in it."

Hans's heart almost stopped beating as he slid down the dike, and he was still more frightened when he saw the hole. It was a very little hole, to be sure, but the water was oozing through drop by drop; and Hans knew how quickly the angry

"YOU SHALL NOT COME IN," HE SAID

sea could tear a great hole if it were given the tiniest opening. He looked about, but there was no one in sight. And when he looked back at the hole he could see that it had grown larger, so that now the water was trickling through in a little stream.

Hans thrust his forefinger into the hole, and found that it fitted exactly. Then he turned to his little brother.

"Run," he said; "run home as fast as you can and tell father that the dike is leaking."

The little fellow started off as fast as his short legs would carry him, and Hans was left alone, waiting and waiting. On the other side of the dike the sea seemed to be muttering to itself as it splash—splash—splashed against the wall.

"I *will* come in—I *will* come in," it seemed to be saying.

Hans thrust his finger in deeper.

"You shall *not* come in—you shall *not* come in," he said aloud.

That was at first, when he was very brave, but later, when little brother could be seen no longer and when his finger began to grow cold and numb, he just kept very still, with his eyes on the road. Then his hand grew numb, and his arm and shoulder, and finally it seemed to him that his whole body was frozen. Sharp cramp pains ran up his arm and down his side, and the sea seemed to be laughing at him for setting his little strength against its great power. Once he almost pulled his finger out, but then he thrust it in farther than ever, and leaned his head against the dike.

O, how long it seemed before, far off down the road, he saw a black spot. It was moving—it was coming nearer and nearer; and at last he could see his father and the neighbors, and could hear them shouting, "We're coming! We're coming!"

Very tenderly they drew out Hans's numb finger, and while they mended the dike with their pickaxes and shovels they praised him for his bravery and told him that he was a real hero. And when the work was done they marched home like an army, two and two, singing, and Hans rode on his father's shoulders.

And if you lived in Haarlem you would hear to this day the story of the brave boy who held back the sea.

### The Flax

The Flax stood in blossom; it had pretty little blue flowers, delicate as a moth's wings and even more delicate. The sun shone on the Flax, and the rain clouds moistened it, and this was just as good for it as it is for little children when they are washed, and afterward get a kiss from their mother; they become much prettier, and so did the Flax.

"The people say that I stand uncommonly well," said the Flax, "and that I'm fine and long, and shall make a capital piece of linen. How happy I am! I'm certainly the happiest of beings. How well I am off! And I may come to something! How the sunshine gladdens, and the rain tastes good and refreshes me! I'm wonderfully happy; I'm the happiest of beings."

"Yes, yes, yes!" said the Hedge-stake. "You don't know the world, but we do, for we have knots in us;" and then it creaked out mournfully—

"Snip-snap-snurre,
Bassellurre!
The song is done."

"No, it is not done," said the Flax. "To-morrow the sun will shine, or the rain will refresh us. I feel that I'm growing. I feel that I'm in blossom! I'm the happiest of beings."

But one day the people came and took the Flax by the head and pulled it up by the root. That hurt; and it was laid in water as if they were going to drown it, and then put on the fire as if it was going to be roasted. It was quite fearful!

"One can't always have good times," said the Flax. "One must make one's experiences, and so one gets to know something."

But bad times certainly came. The Flax was moistened, and roasted, and broken, and hackled. Yes, it did not even know what the operations were called that they did with it. It was put on the spinning wheel—whirr! whirr! whirr!—it was not possible to collect one's thoughts.

"I have been uncommonly happy," it thought in all its pain. "One must be content with the good one has enjoyed. Contented! contented!

O!" And it continued to say that when it was put into the loom, and till it became a large, beautiful piece of linen. All the Flax, to the last stalk, was used in making one piece.

"But this is quite remarkable! I should never have believed it! How favorable fortune is to me! The Hedge-stake is well informed, truly, with its—

'Snip-snap-snurre,
Bassellurre!'

The song is not done by any means. Now it's beginning in earnest. That's quite remarkable! If I've suffered something, I've been made into something! I'm the happiest of all! How strong and fine I am, how white and long! That's something different from being a mere plant: even if one bears flowers, one is not attended to, and only gets watered when it rains. Now I'm attended to and cherished; the maid turns me over every morning, and I get a shower bath from the watering pot every evening. Yes, the clergyman's wife has even made a speech about me, and says I'm the best piece in the whole parish. I cannot possibly be happier!"

Now the Linen was taken into the house, and put under the scissors: how they cut and tore it, and then pricked it with needles! That was not pleasant; but twelve pieces of body linen of a kind not often mentioned by name, but indispensable to all people, were made of it—a whole dozen!

"Just look! Now something has really been made of me! So; that was my destiny. That's a real blessing. Now I shall be of some use in the world, and that's right, that's a true pleasure! We've been made into twelve things, but yet we're all one and the same; we're just a dozen: how charming that is!"

Years rolled on, and now they would hold together no longer.

"It must be over one day," said each piece. "I would gladly have held together a little longer, but one must not expect impossibilities."

They were now torn into pieces and fragments. They thought it was all over now, for they were hacked to shreds, and softened, and boiled; yes, they themselves did not know all that was done to them; and then they became beautiful white paper.

"Now, that is a surprise, and a glorious surprise!" said the Paper. "Now I'm finer than before, and I shall be written on: that is remarkable good fortune."

And really the most beautiful stories and verses were written upon it, and only once there came a blot; that was certainly remarkable good fortune. And the people heard what was upon it; it was sensible and good, and made people much more sensible and better; there was a great blessing in the words that were on this Paper.

"That is more than I ever imagined when I was a little blue flower in the fields. How could I fancy that I should ever spread joy and knowledge among men? I can't yet understand it myself, but it really is so. I have done nothing myself but what I was obliged, with my weak powers, to do for my own preservation, and yet I have been promoted from one joy and honor to another. Each time when I think 'the song is done,' it begins again in a higher and better way. Now I shall certainly be sent about to journey through the world, so that all people may read me. That cannot be otherwise; it's the only probable thing. I have splendid thoughts, as many as I had pretty flowers in the old time. I'm the happiest of beings."

But the Paper was not sent on its travels—it was sent to the printer, and everything that was written upon it was set up in type for a book, or rather for many hundreds of books, for in this way a very far greater number could derive pleasure and profit from the book than if the one paper on which it was written had run about the world, to be worn out before it had got half way.

"Yes, that is certainly the wisest way," thought the Written Paper. "I really did not think of that. I shall stay at home, and be held in honor, just like an old grandfather; and I am really the grandfather of all these books. Now something can be effected; I could not have wandered about thus. He who wrote all this looked at me; every word flowed from his pen right into me. I am the happiest of all."

Then the Paper was tied together in a bundle, and thrown into a tub that stood in the washhouse.

"It's good resting after work," said the Paper. "It's very right that one should collect one's thoughts. Now I'm able for the first time to think of what is in me, and to know one's self is true progress. What will be done with me now? At any rate I shall go forward again: I'm always going forward; I've found that out."

Now, one day all the Paper was taken out and laid by on the hearth; it was to be burned, for it might not be sold to hucksters to be used for covering for butter and sugar, they said. And all the children in the house stood round about, for they wanted to see the Paper burn, that flamed so prettily, and afterwards one could see many red sparks among the ashes, careering here and there. One after another faded out as quick as the wind, and that they called "seeing the children come out of school," and the last spark was the old schoolmaster: one of them thought he had already gone, but the next moment there came another spark. "There goes the schoolmaster!" they said. Yes, they knew all about it; they should have known who it was who went there: we shall get to know it, but they did not. All the old Paper, the whole bundle, was laid upon the fire, and it was soon alight. "Ugh!" it said, and burst out into bright flame. Ugh! that was not very agreeable, but when the whole was wrapped in bright flames, these mounted up higher than the Flax had ever been able to lift its little blue flowers, and glittered as the white Linen had never been able to glitter. All the written letters turned for a moment quite red, and all the words and thoughts turned to flame.

"Now I'm mounting straight up to the sun," said a voice in the flame; and it was as if a thousand voices said this in unison; and the flames mounted up through the chimney and out at the top, and more delicate than the flames, invisible to human eyes, little tiny beings floated

there, as many as there had been blossoms on the Flax. They were lighter even than the flame from which they were born; and when the flame was extinguished, and nothing remained of the Paper but black ashes, they danced over it once more, and where they touched the black mass the little red sparks appeared. The children came out of school, and the schoolmaster was the last of all. That was fun! and the children sang over the dead ashes—

"Snip-snap-snurre,
Bassellurre!
The song is done."

But the little invisible beings all said—

"The song is never done, that is the best of all. We know it, and therefore we're the happiest of all."

But the children could neither hear that nor understand it; nor ought they, for children must not know everything.

### The First Woodpecker

Adapted from Phoebe Cary's poem.

Long ago there lived at the edge of the woods, in a little old house, a tiny old woman. Her house was very neat and clean, and she was very neat and clean, with her shiny black dress, her rustling white apron with its big bow in back, and her gay little red cap. The little old woman did no one any harm, but because she had lived so long by herself she had grown very selfish, and wanted to keep every good thing she could put her hands on for herself.

One day in the summer the little old woman was baking cakes. They were brown and spicy and full of plums, and they smelled—oh, so good! At least, that's what the hungry old man thought who came along the road and smelled the cakes through the open door.

He went to the door and knocked, and when the old lady appeared he bowed to her most politely.

"Please, old lady," he said, "will you give me a cake? I am old, and have had nothing to eat for a long time."

"Just wait," said the little old lady, "and I'll bake you one." "For," said she to herself, "he shall not have one of these big cakes; I'll bake him a little one."

So she took a little piece of dough and put it into the oven; but when she took it out it was as big a cake, and as brown and crispy, as any she had baked before.

"That will never do," she said to herself, and she put the cake on the very top shelf.

Then she took a smaller piece of dough—only a teaspoonful—and made a little cake and thrust it into the oven; but when she opened the door she found that it had swelled and swelled until it was as big as the last one.

"Dear, dear," said the little old woman; "I just must have this one for myself." And she put it on the top shelf.

This time she pinched off a tiny, tiny piece of dough, so small that she could scarcely pat it out into a cake at all. But when she took it out of the oven it was the biggest cake of all, and instead of the one plum which had been in the dough there were plums and plums, just crowding each other.

This was too much. The old woman quickly hid the cake, and snatched up a piece of dry bread, which she handed to the poor man. He said nothing, though he had noticed all that had happened.

When he had gone the old woman felt very badly, for she was really not a bad old woman after all. "I wish," she said, "that I were a bird, so that I might take the hungry man one of these nice cakes."

And then a curious thing happened. The tiny old woman grew smaller and smaller; her neat black dress and white apron and red cap turned to feathers, and she flew out of the window of her little old house.

And now you may hear her any day in the woods, peck, peck, pecking; and you may see her still, in her gay clothes, climbing up the tree trunks, hunting in every hole for food. For she has become a red-headed woodpecker, and must find her food wherever she can.

## AUTUMN STORIES

### The Coming of the Corn

Adapted from *Hiawatha.*

Hiawatha wanted, more than anything else in the world, the good of his people—that Indian tribe which he loved better than himself. As he wandered in the woods he saw the squirrel and the wild goose, the strawberry and the wild grape, and heard the splash of the fish in the river; but he wanted for his people something different, something better than all these.

And so he built a lodge in the forest, far away from his people, and there for seven days and seven nights he fasted, all the time sending up prayers to the Great Spirit for the good of his people. On the fourth day, as he lay half faint with hunger on his bed of leaves, he looked out between the poles of his wigwam and saw approaching through the radiance of the sunset a youth whom he had never seen before.

The young man was tall and straight, and so supple that he swayed in the wind like a sapling. His garments were green and yellow, his hair was long and yellow, and above his forehead green plumes waved. As Hiawatha lay wondering whether this were vision or reality, the youth approached and spoke to him.

"Hiawatha, your prayer has been answered, because it is not a selfish prayer, but asks for the good of your people. I, Mondamin, have been sent to show you how, with labor and struggle, that great good for which you pray may come. Rise and wrestle with me."

Weakly Hiawatha rose, but with the first touch of the stranger he felt himself grow stronger, and more and more strength came to him as they wrestled till the sunset light was gone.

"Enough," cried Mondamin. "You have wrestled well, Hiawatha; to-morrow, at the same hour, I shall come again to try my strength with yours."

With the words he was gone, and Hiawatha's strength went with him. But the next day, and the next, when the sky was reddest with the sunset, Mondamin came again and wrestled with Hiawatha. Just before he vanished on that third day he said, "To-morrow is the day of your

triumph. You will conquer me, and then you must lay me in a shallow grave, where the gentle rain and the warm sun may reach me. But first take from me my green and yellow garments."

And on the fourth day it happened as he had said. Hiawatha felt his strength coming to him in great waves, and he wrestled with such power that suddenly, before he knew how it had happened, Mondamin lay before him on the grass, dead.

WON AS A GIFT FOR HIS PEOPLE

Not quite understanding, but willing to obey, Hiawatha stripped the soiled and torn garments from the young stranger and laid him under the soft mold. For days he watched beside the grave, keeping the earth soft above it, driving away the ravens, and pulling out the weeds. And at last, one morning, he saw peeping through the soft black earth a tiny point of green. Soon it was a long green spear, and before the summer was over there stood above the grave where Mondamin had been laid the first maize plant, with its waving green plumes and its yellow, silken tresses—the wonderful Indian corn, which Hiawatha had won as a gift for his people.

### The Queer Little Baker Man

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All the children were glad when the Little Baker came to town and hung the sign above his queer little brown shop.

"THANKSGIVING LOAVES TO SELL."

Each child ran to tell the news to another child, until soon the streets echoed with the sound of many running feet, and the clear November air was full of the sound of happy laughter, as a crowd of little children thronged as near as they dared to the Little Baker's shop, while the boldest crept so close that they could feel the heat from the big brick oven, and see the gleaming rows of baker's pans.

The Little Baker said never a word. He washed his hands at the windmill waterspout and dried them, waving them in the crisp air. Then he unfolded a long spotless table, and setting it up before his shop door, he began to mold the loaves, while the wondering children drew nearer and nearer to watch him.

He molded big long loaves, and tiny round loaves; wee loaves filled with currants; square loaves with queer markings on them; fat loaves and flat loaves and loaves in shapes such as the children had never seen before, and always as he molded, he sang a soft tune to these words:

"Buy my loaves of brown and white
Molded for the child's delight.
Who forgets another's need
Eats unthankful and in greed;
But the child who breaks his bread
With another, Love has fed."

By and by the children began to whisper to each other.

"I shall buy that very biggest loaf," said the Biggest Boy. "Mother lets me buy what I wish. I shall eat it alone, which is fair if I pay for it."

"Oh," said the Tiniest Little Girl, "that would be greedy. You could never eat so big a loaf alone."

"If I pay for it, it is mine," said the Biggest Boy, boastfully, "and one need not share what is his own, unless he wishes."

"Oh," said the Tiniest Little Girl, but she said it more softly this time, and she drew away from the Biggest Boy and looked at him with eyes that had grown big and round.

"I have a penny," she said to the Little Lame Boy, "and you and I can have one of those wee loaves together. They have currants in them, so we shall not mind if the loaf is small."

"No, indeed," said the Little Lame Boy, whose face had grown wistful when the Biggest Boy talked of the great loaf. "No, indeed, but you shall take the bigger piece."

Then the Little Baker raked out the bright coals from the great oven into an iron basket and he put in the loaves, every one, while the children crowded closer, with eager faces.

When the last loaf was in, he shut the oven door with a clang so loud and merry that the children broke into a shout of laughter.

Then the Queer Little Baker came and stood in his tent door, and he was smiling; and he sang again a merry little tune to these words:

"Clang! clang! my oven floor
My loaves will bake as oft before,
And you may play where shines the sun
Until each loaf is brown and done."

Then away ran the children, laughing and looking back at the door of the shop where the Queer Little Baker stood and where the raked out coals, bursting at times, cast long red lights against the brown walls; and as they ran they sang the Queer Little Baker's merry song:

"Clang! clang! my oven floor
The loaves will bake as oft before."

Then some played at hide and seek among the sheaves of ungarnered corn, and some ran gleefully through the heaped up leaves of russet and gold for joy to hear them rustling. But some, eager, returned home for pennies to buy a loaf when the Queer Little Baker should call.

So the hour passed, till, above the sound of the rustling corn, and the sounds of all other voices the children heard the Little Baker's call:

"The loaves are ready, white and brown,
For every little child in town,
Come buy Thanksgiving loaves and eat,
But only Love can make them sweet."

Soon all the air was filled with the sound of swift-running feet, as the children flew like a cloud of leaves blown by the wind in answer to the Queer Little Baker's call. When they came to his shop they paused, laughing and whispering, as the Little Baker laid out the loaves on the spotless table.

"This is mine," said the Biggest Boy, and laying down a silver coin he snatched the great loaf and ran away to break it by himself.

Then came the Impatient Boy, crying:

"Give me my loaf. This is mine, and give it to me at once. Do you not see my coin is silver? Do not keep me waiting."

The Little Baker said never a word. He did not smile, he did not frown, he did not hurry. He gave the Impatient Boy his loaf and watched him, as he, too, hurried away to eat his loaf alone.

Then came others crowding and pushing with their money, the strongest and rudest gaining first place; and snatching each a loaf, they ran off to eat without a word of thanks, while some very little children looked on wistfully, not able even to gain a place. All this time the Queer Little Baker kept steadily on, laying out the beautiful loaves on the spotless table.

A Gentle Lad came, when the crowd grew less, and, giving all the pennies he had, he bought loaves for all the little ones; so that, by and by, no one was without a loaf. The Tiniest Little Girl went away, hand in hand with the Little Lame Boy to share his wee loaf, and both were smiling, and whoever broke one of those smallest loaves found it larger than it had seemed at first.

But now the Biggest Boy was beginning to frown.

"This loaf is sour," he said angrily.

"But is it not your own loaf," said the Baker, "and did you not choose it yourself, and choose to eat it alone? Do not complain of the loaf, since it is your own choosing."

Then those who had snatched the loaves ungratefully and hurried away, without waiting for a word of thanks, came back.

"We came for good bread," they cried, "but those loaves are sodden and heavy."

"See the lad there with all those children. His bread is light. Give us, too, light bread and sweet."

But the Baker smiled a strange smile.

"You chose in haste," he said, "as those choosé who have no thought in sharing. I cannot change your loaves. I cannot choose for you. Had you, buying, forgotten that mine are Thanksgiving loaves? I shall come again; then you can buy more wisely."

Then these children went away thoughtful.

But the very little children and the Gentle Lad sat eating their bread with joyous laughter, and each tiny loaf was broken into many pieces as they shared with each other, and to them the bread was as fine as cake and as sweet as honey.

Then the Queer Little Baker brought cold water and put out the fire. He folded his spotless table and took down the boards of his little brown shop, and packed all into his wagon and drove away, singing a quaint tune. Soft winds rustled the corn and swept the boughs together with a musical chuckling. And where the brown leaves were piled thickest, making a little mound, sat the Tiniest Little Girl and the Little Lame Boy eating their sweet currant loaf happily together.

### Androcles and the Lion

A story of gratitude

Long, long ago, in Rome, the great theater was crowded to the very top. The emperor, in his gorgeous purple robe, sat in his box with his attendants about him, and all the people, in their best clothes, sat on the marble seats, fairly holding their breath with excitement. For they were to see the sport that they liked best of all—a very cruel sport it would seem to us. A runaway slave, who had been recaptured, was to be torn to pieces by a lion, and from the iron cage the roars of the savage beast could be heard from time to time.

Now the slave was led in, trembling. He fell on his knees in the center of the arena, and raised his clasped hands, pleading for mercy, towards the emperor, but the emperor's eyes were cold and hard, and the people shouted, "The lion! Bring in the lion."

Suddenly the great doors of the cage beneath the imperial box swung outward. There was a breathless pause, and then, slowly, as though he knew his prey could not escape him, the lion stepped out onto the sand of the arena. He was a lean and hungry lion, for he had been kept without food that he might be the more savage and furnish better sport for the spectators. O, how powerful his claws looked, and how the people who were safe on the high seats trembled as he snarled and showed his white teeth.

A moment he stood there, lashing his sides with his tail and turning his shaggy head from side to side. And then, suddenly, he spied the slave, crouched on the sand, with bowed head. The great cat began to creep slowly toward his prey, switching his tail and narrowing his eyes. The people scarcely breathed; would he never spring? Yes, he was crouching now for his leap! Just then the slave raised his head, and the lion, his powerful muscles already released for the spring, checked himself and fell short. And, marvel of marvels, instead of rushing at the cowering slave with steel claws out, the lion fairly groveled in the sand before him! He rubbed against the man and fondled him with his paws, while the noise of his mighty purring reached to the farthest part of the great theater.

Then how the people shouted! And the emperor, leaning over the railing of his box, beckoned to the slave to come near. With his hand on the lion's head, the slave approached.

"Are you a worker of magic," queried the emperor, "or how have you tamed the most savage beast of the jungle?"

"Oh, most gracious majesty," replied the slave—for he was a learned slave and knew how to speak to an emperor—"thou knowest that I escaped from a most cruel master and fled to Africa. There I hid in a cave on the edge of the desert, and one day there came into my cave a great lion.

"He whined and held up his paw, and I saw, sticking in it, a long thorn. Because I have always loved animals and cannot bear to see one suffer, I conquered my fear and drew out the thorn, and the beast, after licking my hands, left me.

"Thou knowest, too, most gracious sire, that I was taken and brought back to Rome, and condemned to be torn to pieces by a lion. This lion has a better memory than I have—I did not recognize him, but he knew me, and has spared my life, as thou hast seen."

The slave ceased, and the people, who had heard enough to guess at what had happened, sent up a mighty shout.

"Life and freedom! Life and freedom for the slave!" they cried.

And the emperor, to please himself as well as to please the people, said, "So great a marvel has never been seen in Rome. Both are free—the lion and the slave—and no man may again lay hands on them."

And with his hand still on the lion's head, the freed slave walked out.

### The Larks in the Cornfield

Once upon a time there lived in a great big cornfield a happy Lark family—a mother Lark and her little baby Larks. It was a beautiful, quiet place to live, but the mother Lark had one worry; she knew that when the corn was ripe and the reapers came, their sharp scythes and their heavy shoes would hurt the little Larks. So she watched and listened very carefully, and when she had to leave the nest to gather food she told the little Larks to watch and listen very carefully for any sign of the reapers' coming.

One day she came home and found the little Larks almost fluttering out of the nest in their excitement.

"Oh, mother, mother," they cried as soon as they could see her. "Take us away, take us away at once. To-day the farmer was walking with his sons in the cornfield, and he said, 'The corn is ripe and must be cut; let us get our neighbors to help us.' And he told his sons to go at once and ask all the neighbors to come to-morrow and help him reap his corn."

"Is that all?" laughed the mother Lark. "We'll not move to-day, and you needn't be frightened at all; for if he waits for his neighbors to come and do his reaping we are safe for some time. Listen carefully to-morrow and tell me what he says."

The next evening when she came home she found the little Larks chattering and chirping with fear.

"Mother, dear mother," they cried all together, "you must surely move us now. To-day the farmer walked again in his cornfield, and we heard him say, 'This corn is *very* ripe; we cannot wait for our neighbors now. Go, my sons, and ask your uncles and your cousins and your grandfathers to come to-morrow and help us cut the corn.' And they went—we saw them go. Oh, mother, surely you will move us to-night."

But the mother Lark only laughed. "No," she said, "we'll not go to-night. We are safe enough yet. The uncles and cousins and grandfathers will be so busy cutting their own corn that they'll not disturb our field for a time. Go to sleep, my babies, but listen carefully to-morrow."

The third evening the mother Lark came home and the little ones said, "To-day when the farmer came to his cornfield he was quite angry and gruff. 'This corn will be ruined; it's getting far too ripe,' he said, 'we'll wait no longer for our neighbors and our relatives—we'll cut the corn ourselves.' And he called his sons and sent them out to hire reapers to come and reap the corn to-morrow. But we weren't frightened, mother, for we know now that he never means what he says."

"Indeed," said the mother Lark, beginning to bustle about, "he means it *this* time. When a man attends to his own business instead of waiting for someone else to do it, the business gets done. Come, children, we are moving out to-night."

## WINTER STORIES

### The Ant and the Grasshopper

There was once a foolish little Grasshopper that spent all her time playing. Through the long summer and autumn she did nothing but sing from morning till night. So when winter came and the snow covered the ground, she hadn't a morsel of food stored away in her house.

Soon she was so faint with hunger that she begged her neighbor, the Ant, to give her something to eat. "I am starving," she said; "give me a grain of wheat."

"Why did you not save some grain at harvest time?" asked the Ant. "There was plenty to be had. What were you doing?"

"I was singing," answered the Grasshopper, "I had no time for work."

"Hoity toity!" cried the Ant; "if you sang all summer you must dance hungry to bed in winter."

### The Fir Tree

Out in the forest stood a pretty little Fir Tree. It had a good place; it could have sunlight, air there was in plenty, and all around grew many larger comrades—pines as well as firs. But the little Fir Tree wished ardently to become greater. It did not care for the warm sun and the fresh air; it took no notice of the peasant children, who went about talking together, when they had come out to look for strawberries and raspberries. The children often came with a whole basketful, or with a string of berries which they had strung on a straw. Then they would sit down by the little Fir Tree and say, "How pretty and small this one is!" The Fir Tree did not like that at all.

Next year he had grown bigger, and the following year he was taller still.

"Oh, if I were only as tall as the others!" sighed the little Fir. "Then I would spread my branches far around and look out from my crown into the wide world. The birds would then build nests in my boughs, and when the wind blew I would nod grandly."

It took no pleasure in the sunshine, in the birds, or in the red clouds that went sailing over it morning and evening.

When it was winter, and the snow lay all around, white and sparkling, a hare would often come jumping along and spring right over the little Fir Tree. Oh, that made him so angry! But two winters went by, and when the third came, the little Tree had grown so tall that the hare was obliged to run around it.

"Oh, to grow, to grow, and become old; that's the only fine thing in the world," thought the Tree.

In the autumn the woodcutters always came and felled a few of the largest trees; that was done this year too, and the little Fir Tree, that was now quite well grown, shuddered with fear, for the stately trees fell to the ground with a crash, and their branches were cut off, so that the trees looked quite naked, long and slender, and could hardly be recognized. Then they were laid upon wagons, and the horses dragged them away out of the wood. Where were they going? What destiny awaited them?

In the spring, when the Swallows and the Stork came, the Tree asked them, "Do you know where the big firs were taken? Did you meet them?"

The Swallows knew nothing about it, but the Stork looked thoughtful, nodded his head and said:

"Yes, I think so. I met many new ships when I flew out of Egypt; on the ships were tall masts; I fancy these were the trees. They smelt like fir. I can assure you they're stately—very stately."

"Oh, that I were big enough to go over the sea. What kind of a thing is this sea, and how does it look?"

"It would take long to explain all that," said the Stork, and he went away.

"Rejoice in thy youth," said the Sunbeams; "rejoice in thy fresh growth, and in the young life that is within thee."

And the Wind kissed the Tree, and the Dew wept tears upon it; but the Fir Tree did not understand.

When Christmas time approached, quite young trees were felled, sometimes trees which were neither so old nor so large as this Fir Tree, that never rested, but always wanted to go away. These beautiful young trees kept all their branches; they were put upon wagons, and horses dragged them away out of the wood.

"Where are they all going?" asked the Fir Tree. "They are not greater than I—indeed, one of them was much smaller. Why do they keep all their branches? Whither are they taken?"

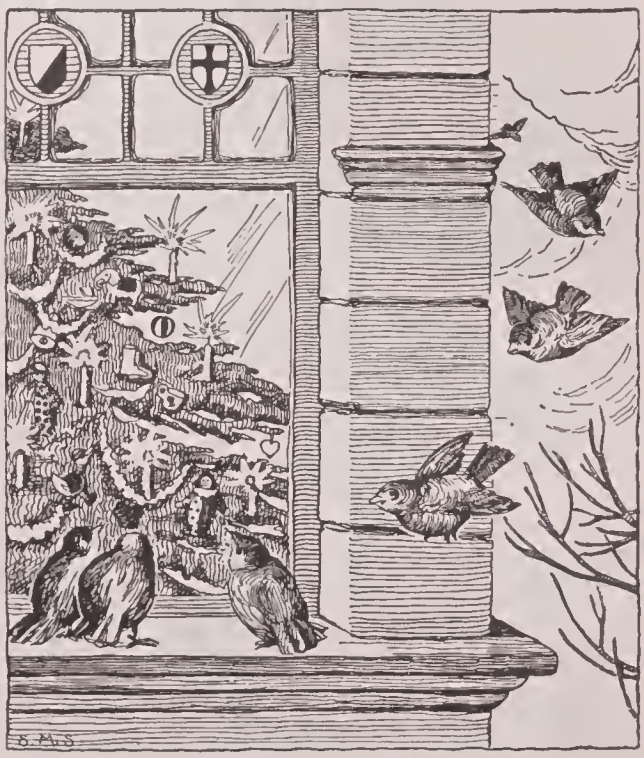
"We know that! We know that!" chirped the Sparrows. "Yonder in the town we looked in at the windows. We know where the fir trees go. We have looked in at the windows and have seen that they are planted in the middle of a warm room and dressed up in the greatest splendor with the most beautiful things—gilt apples, honey cakes, playthings, and many hundreds of candles."

"And then?" asked the Fir Tree, trembling through all its branches. "And then? what happens then?"

"Why, we have not seen anything more. But it was wonderful!"

"Perhaps I may be destined to this glorious end one day!" cried the Fir Tree, rejoicing.

"That is even better than traveling across the sea. How I long for it! If it were only Christmas! Now I am great and grown-up, like the rest who were led away last year. Oh, if I were only on the wagon! If I were only in the warm room amidst all the pomp and splendor! And



"YONDER IN THE TOWN WE LOOKED IN AT THE WINDOWS"

then? Yes, then something even better will come, something far more charming, else why should they adorn me so? There must be something grander, something greater still to come; but what? Oh! I'm suffering, I'm longing! I don't know myself what is the matter with me!"

"Rejoice in us," said Air and Sunshine. "Rejoice in thy fresh youth here in the woodland."

The Fir Tree did not rejoice at all, but it grew and grew; winter and summer it stood there, green, dark green. The people who saw it said, "That's a handsome tree!" and at Christmas time it was felled before any of the others. The ax cut deep into its marrow, and the tree fell to the ground with a sigh; it felt a pain, a sensation of faintness, and could not think at all of happiness, for it was sad at parting from its home, from the place where it had grown up; it knew that it should never again see the dear old companions, the little bushes and the flowers all around, perhaps not even the birds.

The Tree came to itself only when it was unloaded in a yard, with other trees, and heard a man say:

"This one is famous; we want only this one for our Christmas!"

Now two servants came in gay liveries, and carried the Fir Tree into a large, beautiful room. All around the walls hung pictures, and by the great stove stood large Chinese vases with lions on the covers; there were rocking-chairs, silken sofas, great tables covered with picture books, and toys worth a hundred times a hundred dollars; at least, the children said so. And the Fir Tree was put into a great tub filled with sand; but no one could see that it was a tub, for it was hung round with green cloth, and stood on a large, many-colored carpet. Oh, how the Tree trembled! What was to happen now? The servants, and the young ladies also, decked it out. On one branch they hung little bags cut out of colored paper, and every bag was filled with sweetmeats. Golden apples and walnuts hung down as if they grew there, and more than a hundred little candles, red, white, and blue, were fastened to the different boughs. Dolls that looked exactly like real people—the Tree had never seen such before—swung among the foliage, and high on the summit of the Tree was fixed a tinsel star. It was splendid.

"This evening," said all, "this evening it will shine."

"Oh," thought the Tree, "that it were evening already! Oh, that the lights may be soon lit! When will that be done? I wonder if trees will come out of the forest to look at me? Will the Sparrows fly against the panes? Shall I grow fast here, and stand adorned in summer and winter?"

But the Tree had a backache from mere longing, and the backache is just as bad for a tree as the headache for a person.

At last the candles were lighted. What a brilliance! what a splendor! The Tree trembled so in all its branches that one of the candles set fire to a green twig, and it was scorched, but one of the young ladies hastily put the fire out.

Now the Tree might not even tremble. Oh, that was terrible! It was so afraid of setting fire to some of its ornaments, and it was quite bewildered with all the brilliance. And now the folding doors were thrown open, and a number of children rushed in as if they would have overturned the whole Tree, while the older people followed more deliberately. The little ones stood quite silent, but only for a minute; then they shouted till the room rang; they danced gleefully round the Tree, and one present after another was plucked from it.

"What are they about?" thought the Tree. "What's going to be done?"

And the candles burned down to the twigs, and as they burned down they were extinguished, and then the children were given permission to plunder the Tree. They rushed in upon it, so that every branch cracked again; if it had not been fastened by the top and by the golden star to the ceiling, the Tree certainly would have fallen down.

The children danced about with their pretty toys. No one looked at the Tree except one old man, who came up and peeped among the branches, but only to see if a fig or an apple had not been forgotten.

"A story! A story!" shouted the children, as they drew a little fat man toward the Tree. He sat down just beneath it—"for then we shall be in the green wood," said he, "and the Tree may have the advantage of listening to my tale. But I can tell only one. Will you hear the story of Ivede-Avede, or of Klumpey-Dumpey, who fell downstairs, and still was raised up to honor and married the princess?"

"Ivede-Avede," cried some; "Klumpey-Dumpey," cried others, and there was a great crying and shouting. Only the Fir Tree was silent, and thought, "Shall I not be in it? Shall I have nothing to do in it?" But he had been in the evening's amusement and had done what was required of him.

And the fat man told about Klumpey-Dumpey, who fell downstairs, and yet was raised to honor and married the princess. And the children clapped their hands, and cried, "Tell another, tell another!" for they wanted to hear about Ivede-Avede; but they got only the story of Klumpey-Dumpey.

The Fir Tree stood quite silent and thoughtful; never had the birds in the wood told such a story as that; Klumpey-Dumpey fell downstairs, and yet came to honor and married the princess at last!

"Yes, so it happens in the world!" thought the Fir Tree, and believed it must be true, because that was such a nice man who told it.

"Well, who can know? Perhaps I shall fall downstairs, too, and marry a princess!" And it looked forward with pleasure to being adorned again, the next evening, with candles and toys, gold and fruit. "To-morrow I shall not tremble," it thought. "I shall rejoice in all my splendor. To-morrow I shall hear the story of Klumpey-Dumpey again, or perhaps that of Ivede-Avede, too."

And the Tree stood all night quiet and thoughtful.

In the morning the servants and the chambermaid came in.

"Now my splendor will begin afresh," thought the Tree.

But they dragged him out of the room and upstairs to the garret, and there they put him in a dark corner where no daylight shone.

"What's the meaning of this?" thought the Tree. "What am I to do here? What is to happen?"

And he leaned against the wall, and thought, and thought. And he had time enough, for days and nights went by, and nobody came up; and when at length some one came, it was only to put some great boxes in a corner. Now the Tree stood quite hidden away, and the supposition is that it was quite forgotten.

"Now it's winter outside," thought the Tree. "The earth is hard and covered with snow, and people cannot plant me; therefore I suppose I'm to be sheltered here until spring comes. How considerate that is! How good people are! If it were only not so dark here, and so terribly solitary! Not even a little hare! It was pretty out there in the wood, when the snow lay thick and the hare sprang past; yes, even when he jumped over me; but then I did not like it. It is terribly lonely up here!"

"Piep! Piep!" said a little Mouse, and crept forward, and then came another little one. They smelt at the Fir Tree, and then slipped among the branches.

"It's horribly cold," said the two little Mice, "or else it would be comfortable here. Don't you think so, old Fir Tree?"

"I'm not old at all," said the Fir Tree. "There are many much older than I."

"Where do you come from?" asked the Mice. "And what do you know?" They were dreadfully inquisitive.

"Tell us about the most beautiful spot on the earth. Have you been there? Have you been in the storeroom, where cheeses lie on the shelves, and hams hang from the celling; where one dances on tallow candles, and goes in thin and comes out fat?"

"I don't know that," replied the Tree; "but I know the wood, where the sun shines and the birds sing."

And then it told all about its youth.

And the little Mice had never heard anything of the kind; and they listened, and said:

"What a number of things you have seen! How happy you must have been!"

"I?" replied the Fir Tree; and it thought about what it had told. "Yes, those were really quite happy times." But then he told of the Christmas Eve, when he had been hung with sweetmeats and candles.

"Oh!" said the little Mice, "how happy you have been, you old Fir Tree!"

"I'm not old at all," said the Tree. "I came out of the wood only this winter. I'm only rather backward in my growth."

"What splendid stories you can tell!" said the little Mice.

And next night they came with four other little Mice, to hear what the Tree had to relate: and the more it said, the more clearly did it remember everything, and thought, "Those were quite merry days. But they may come again. Klumpey-Dumpey fell downstairs, and yet he married the princess. Perhaps I may marry a princess, too!" And then the Fir Tree thought of a pretty little Birch Tree that grew out in the forest; for the Fir Tree, that Birch was a real princess.

"Who's Klumpey-Dumpey?" asked the little Mice.

And then the Fir Tree told the whole story. It could remember every single word; and the little Mice were ready to leap to the very top of the tree with pleasure. Next night a great many more Mice came, and on Sunday two Rats even appeared; but these thought the story was not pretty, and the little Mice were sorry for that, for now they also did not like it so much as before.

"Do you know only one story?" asked the Rats.

"Only that one," replied the Tree. "I heard that on the happiest evening of my life; I did not think then how happy I was."

"That's a very miserable story. Don't you know any about bacon and tallow candles—a storeroom story?"

"No," said the Tree.

"Then we'd rather not hear you," said the Rats.

And they went back to their own people. The little Mice at last also stayed away; and then the Tree sighed and said, "It was very nice when they sat around me, the merry little Mice, and listened when I spoke to them. Now that's past, too. But I shall remember to be pleased when they take me out."

But when did that happen? Why, it was one morning that people came and rummaged in the garret; the boxes were put away, and the Tree was brought out; they certainly threw him rather roughly on the floor, but a servant dragged him away at once to the stairs, where the daylight shone.

"Now life is beginning again," thought the Tree.

It felt the fresh air and the first sunbeams, and then it was out in the courtyard. Everything passed so quickly that the Tree quite forgot to look at itself, there was so much to look at all around. The courtyard was close to a garden, and there everything was blooming; the roses hung fresh and fragrant over the little paling, the linden trees were in blossom, and the swallows cried, "Quinze-wit! quinze-wit! my husband's come!" But it was not the Fir Tree that they meant.

"Now I shall live!" cried the Tree, rejoicingly, and spread its branches far out; but, alas! they were all withered and yellow, and it lay in the corner among nettles and weeds. The tinsel star was still upon it, and shone in the bright sunshine.

In the courtyard a couple of the merry children were playing who had danced round the Tree at Christmas time, and had rejoiced over it. One of the youngest ran up and tore off the golden star.

"Look at what is sticking to the ugly old Fir Tree!" said the child, and he trod on the branches till they cracked under his boots.

And the Tree looked at all the blooming flowers and the splendor of the garden, then looked at itself, and wished it had remained in the dark corner of the garret; it thought of its fresh youth in the wood, of the merry Christmas Eve, and of the little Mice which had listened so pleasantly to the story of Klumpey-Dumpey.

"Past! past!" said the old Tree. "Had I but rejoiced when I could have done so! Past! past!"

And the servant came and chopped the Tree into little pieces; a whole bundle lay there; it blazed brightly under the great brewing copper, and it sighed deeply, and each sigh was like a little shot; and the children, who were at play there, ran up, seated themselves by the fire, looked into it, and cried "Puff! puff!" But at each explosion, which was a deep sigh, the Tree thought of a summer day in the woods, or of a winter night there, when the stars beamed; he thought of Christmas Eve and of Klumpey-Dumpey, the only story he had ever heard or knew how to tell; and thus the Tree was burned.

The boys played in the garden, and the youngest had on his breast a golden star, which the Tree had worn on its happiest evening. Now that was past, and the Tree's life was past, and the story is past, too: past! past!—and that's the way with all stories.

**The Little Match Girl**

It was on a bitterly cold, snowy New Year's Eve. A little girl was wandering in the dark, cold streets; she was bareheaded and barefooted. She had certainly worn slippers when she left home, but they were not much good, for they were so huge. They had last been worn by her mother, and they fell off the child's feet when she was running across the street to avoid some carriages that were rolling by. One of the shoes could not be found at all; and the other was picked up by a boy who ran off with it, saying that it would do for a cradle when he had children of his own. So the poor little girl had to go on with her little bare feet, which were red and blue with cold.

She carried a quantity of matches in her apron, and she held a packet of them in her hand. Nobody had bought any of her during all the

HER LITTLE HANDS WERE STIFF WITH COLD

long day; nobody had given her a penny. The poor little creature was hungry and perishing with cold, and she looked the picture of misery. The snowflakes fell upon her long, yellow hair which curled so prettily about her face, but she paid no attention to that.

Lights were shining from every window, and there was a most delicious odor of roast goose in the streets, for it was New Year's Eve—she could not forget that. She found a corner where one house projected a little beyond the next one, and here she crouched, drawing up her feet under her, but she was colder than ever. She did not dare go home, for she had not sold any matches, and had not earned a single penny. Her father would beat her; besides it was almost as cold at home as it was here. They had only the roof over them, and the wind whistled through it, although they stuffed up the biggest cracks with rags and straw. Her little hands were stiff with cold.

Oh, one little match would do some good! Should she pull one out of the bundle and strike it on the wall to warm her fingers? She pulled one out. *Critch*, how it spluttered, how it blazed! It burned with a bright, clear flame just like a little candle when she held her hand round it.

It was a very curious candle, too. In its light the little girl fancied she was sitting in front of a big stove with polished brass feet and handles. There was a splendid fire blazing in it and warming her so beautifully, but—what happened?—just as she was stretching out her feet to warm them, the blaze went out, the stove vanished, and she was left sitting with the end of the burned-out match in her hand.

She struck a new one; it burned, blazed up, and where the light fell upon the wall it became transparent like gauze, and she could see right through it into the room. The table was spread with a snowy cloth and pretty china; a roast goose stuffed with apples and prunes was steaming on it. And what was even better, the goose hopped from the dish with the carving knife sticking in his back, and it waddled across the floor. It came right up to the poor child, and then—the match went out, and there was nothing left to be seen but the thick black wall.

Again, she lit another match. This time she was sitting under a lovely Christmas tree. It was much larger and more beautifully decorated than the one she had seen when she peeped through glass doors at the rich merchant's house this very last Christmas. Thousands of lighted candles gleamed upon its branches, and colored pictures such as she had seen in the shop windows looked down upon her. The little girl stretched out her hands to touch them, but—out went the match.

All the Christmas candles rose higher and higher, till she saw that they were only the twinkling stars.

So she struck another match against the wall, and this time it was her grandmother who appeared in the circle of the flame. She saw her quite clearly and distinctly, looking so gentle and happy.

"Grandmother!" cried the little creature, "Oh, do take me with you! I know you will vanish when the match goes out; you will vanish like the warm stove, and the goose, and the Christmas tree."

She hastily struck a whole bundle of matches, because she did so long to keep her grandmother with her. The light of the matches made it as bright as day. Grandmother had never before looked so big, nor so beautiful. She lifted the little match girl up in her arms, and they soared in a circle of light and joy, far, far above the earth, where there was no more cold, no hunger, no pain, for they were with God.

**Supplementary List.** SPRING STORIES. *What Was Her Name?* (Richards' *Five Minute Stories*); *Little Ida's Flowers* (Andersen); *Legend of the Arbutus.*

SUMMER STORIES. *Rhoecus* (adapted from Lowell's poem); *King of the Golden River* (Ruskin); *Five Peas in a Pod* (Andersen); the story of Joan of Arc; *Horatius at the Bridge* (from Macaulay's poem).

AUTUMN STORIES. The story of Ruth (from the Bible); *The First Thanksgiving;* the story of Arachne (Greek myth); *Baucis and Philemon* (Greek myth); *The Discontented Stone-Cutter* (Japanese legend).

WINTER STORIES. Parts of Dickens' *Christmas Carol; The Happy Prince* (Oscar Wilde); the Christmas story (from the Bible); *The Birds' Christmas Carol* (Riggs); *How the Fir Tree Became the Christmas Tree.*

**Related Subjects.** The following articles in these volumes will be helpful in connection with this article on story-telling:

| | |
|---|---|
| Aladdin | Fiction |
| Ali Baba | Games and Plays |
| Alice's Adventures in Wonderland | Hiawatha |
| | Language |
| Arabian Nights | Legend |
| Bible, subhead *The Bible for Children* | Literature, subtitles *Literature for Children* and *Graded Lists for Study* |
| Bluebeard | |
| Cinderella | |
| Drama, subtitle *Shakespearean Drama in Schools* | Mother Goose |
| | Mythology |
| Fable | Novel |
| Fairies | Rip Van Winkle |
| | Robinson Crusoe |

**STOSS,** *shtohs,* VEIT (about 1440-1533), one of the greatest masters of wood carving Germany has ever produced, and a famous sculptor. Many of the statements given about his life are a matter of doubt, but it is believed that he was born and educated at Nuremberg; it is known that he practiced his profession alternately in that city and in Cracow. Most of his creations are religious in character, and they show a depth of spiritual understanding rare among artists of his time. Stoss's works may be seen in cathedrals and public buildings in various parts of Germany. Among the most notable of his wood carvings are the high altar in the Church of Saint Mary's, Cracow, and *The Angel's Salutation* in the Nuremberg Church of Saint Lawrence. His sculptured stone figures include the red marble *Monument of King Casimir IV* and three reliefs entitled *Last Supper, Christ on the Mount of Olives* and *Taking of Christ.* The Nuremberg Germanic Museum possesses his famous relief *Coronation of the Blessed Virgin* and several other examples of his art.

**STOVE,** an enclosure of metal, brick or earthenware, in which fires are built for heating houses or for cooking. The modern stove heater, an outgrowth of the cast-iron box stove invented by Benjamin Franklin in 1744, is constructed of circular steel plates with draughts and dampers for regulating the heat. Although it adds greatly to the dust content of the air and absorbs the moisture of a room, it warms a house splendidly, giving out from forty to sixty per cent of the heating value of the fuel, which is usually coal, while fireplaces do not utilize more than ten or fifteen per cent. The heater is the principal device for warming farm buildings, but in modern city structures heating is generally accomplished by hot-air furnaces, steam heat or hot-water heat. See HEATING AND VENTILATION.

While the heater has only one chamber, where the fire burns on a barred grate, the cookstove has one or two ovens for baking, and the top of the stove is flat, with several holes over the fire for pots. Since gas and electricity have come into use, iron cookstoves have gradually given way to gas and electric stoves, as the latter are cleaner and they render work less arduous. Oil and alcohol are also used to heat small, portable stoves for cooking purposes in summer camps, and oil and gasoline stoves are common in kitchens in communities where more modern innovations are lacking.

**STOWE,** *sto,* HARRIET ELIZABETH BEECHER (1811-1896), an American novelist, remembered chiefly as the author of *Uncle Tom's Cabin.* She was the sister of Henry Ward Beecher, and was born and educated at Litchfield, Conn. Her family moved first to Boston and then to Cincinnati, where her father was made president of the newly established Lane Theological Seminary; and in 1836 Harriet was married to Professor Calvin E. Stowe of that institution. The Ohio River was the dividing line between free and slave soil, and she must have seen many slaves escaping to freedom, perhaps at times even aiding in their escape. She visited homes in Kentucky, also, where she witnessed some of the scenes described in *Uncle Tom's Cabin.* In 1850 Professor Stowe and his wife moved to Brunswick, Me., and later to Andover, Mass. After her husband's death in 1886 Mrs. Stowe lived quietly in Hartford, Conn.

Mrs. Stowe, because of her famous novel published in 1852, is one of the small body of writers whose productions are so completely a part of the political development of the United States as to make it difficult to judge her work

as literature. Her masterpiece was written from an impulse to show the Northern states the real nature of slavery, and it is naturally strongly partisan. It does not fail, however, to reveal the pleasant side of the slave life. Since it was written under pressure in order to keep up with its publication as a serial, it has the faults which belong to all hasty work, but it is, nevertheless, a great book because of its strong and clear pictures. That it is remarkably dramatic in its nature is shown by the great popularity it still has in parts of the country as a play. *Uncle Tom's Cabin* has been translated into at least twenty-three languages, and it is not too much to say that it has not only had a wider sale than any other work by an American novelist, but has been farther-reaching in its effects than any other piece of fiction ever written.

Of Mrs. Stowe's other works, the best are *The Minister's Wooing* and *Oldtown Folks,* really charming sketches of New England life. *Dred* is a novel of slave life which never became very popular, and *A Dog's Mission* and *Little Pussy Willow* are stories for children.

Consult L. B. Stowe's *Harriet Beecher Stowe: The Story of Her Life.*

**STRA'BO** (about 64 B.C.-about A.D. 19), a celebrated Greek geographer and historian. He was born at Amasia, in Pontus, removed to Rome when he was about thirty-five years of age, and made that city his home for most of the rest of his life. He traveled extensively, however, in Arabia and through Southern Europe and Northern Africa. It was on these journeys, supplemented by the works of earlier writers on geography, that his great *Geography* was based. The seventeen books of this work are extant, the first two dealing with physical geography, the next eight with Europe, six with Asia, and one with Africa. This is the most important work on geography which has come down from ancient times, in that it attempted to gather together all the knowledge of the science attainable. Strabo also wrote a history in forty-three books in continuation of the work of Polybius, but this has been lost.

**STRACHAN,** *strawn,* JOHN (1778-1867), a Canadian churchman and educator, first Anglican bishop of Toronto, first president of the University of King's College (now the University of Toronto), founder of Trinity University, and member of the "Family Compact." Bishop Strachan was the most conspicuous figure in the Church of his day. He was at the same time a skilful statesman, and, more than any of his contemporaries, he directed the policy of the ruling group.

Bishop Strachan was born at Aberdeen, Scotland. He attended the grammar school there and was graduated from King's College, Cambridge, in 1796. Three years later he emigrated to Canada, where he opened a boys' school at Kingston. There, and later at Cornwall, and at Toronto, the school flourished and eventually became the most famous of its kind in Canada. Under his influence came many boys who were afterwards powerful in Canadian affairs. Two of his pupils were Robert Baldwin and Sir John Beverley Robinson.

JOHN STRACHAN

While continuing his school, Strachan entered the Anglican ministry, was ordained deacon in 1803 and priest in 1804, and for eight years was curate at Cornwall. He removed to Toronto in 1812, became archdeacon in 1827 and first bishop of Toronto in 1839. During the War of 1812 he was active in public affairs, and in 1815 was rewarded by an appointment to the Executive Council. For nearly forty years thereafter his activities were almost as much political as ecclesiastical. His political activities, to be sure, concerned themselves, for the most part, with religious or educational matters. Strachan opposed the division of the Clergy Reserves, but his special aim was to secure church control of higher education. To this end he founded the University of King's College in 1843. When King's College was reorganized as a provincial institution free of religious tests and given a new name as the University of Toronto, Bishop Strachan founded Trinity University in 1852. Even though he founded this second institution, he seems to have realized that the Anglican Church could not have a legalized preference in education, and in the closing years of his life he restricted his activities to his ecclesiastical duties. Ambitious, shrewd, forceful, able, Bishop Strachan was one of the strong men of his day.

**STRADIVARIUS,** *strad i va'ri us,* ANTONIO (1644-1737), one of the greatest violin makers of all time. He was born at Cremona, Italy, and early entered the employ of Nicola Amati, a celebrated Cremonese master of violin mak-

ing. Not until 1690 did he free himself from the traditions of the Amati school and begin to exhibit a style of his own. From 1700 to 1715 his instruments reached the height of perfection, not only in brilliance of tone and power, but in the excellence of form and wonderful precision with which the minutest detail was executed. He seldom afterward deviated from his standard pattern. The Stradivarii of his later period were made merely under his direction, and they therefore never again reached the standard of perfection of the master's own products, which brought fabulous prices.

At the time of his death many unfinished instruments were found in his workshop. These were completed either by his sons or his pupils, but bore his name on the printed labels. Unsuspecting purchasers have been deceived into buying instruments having the outward appearance of his violins, but there are very few genuine specimens in existence.

**STRAFFORD,** *straf'erd,* THOMAS WENTWORTH, First Earl of (1593-1641), an English statesman, the signing of whose death warrant was one of the greatest blots on the character of Charles I. He was born in London, of an ancient family, educated at Saint John's College, Cambridge, and in 1614 and 1621 was elected to Parliament.

**Opposed the King's Policies.** In the second Parliament of which he was a member, he stood strongly for the rights of that body, and this spirit of resistance to the aggressions of the king characterized him also in the first Parliament of Charles I. He did not, however, sympathize with the Puritans nor share their intense hostility toward the Crown. In 1627 he was imprisoned for a short time for refusing to pay ship money, a tax the king levied upon persons and communities for his national defense, and in 1628 was one of the advocates of the Petition of Right.

**Became Follower of the King.** Feeling that he could not follow Parliament further in its demands, he accepted from the king, in 1628, the presidentship of the Council of the North, and was created Baron Wentworth and later, Viscount Wentworth. In his dealing with affairs in the north he showed himself very zealous to restore order and gradually he identified himself more and more thoroughly with the king and became less and less in sympathy with Parliament. In 1633 he went to Ireland as lord deputy, and there introduced his famous system of "thorough," as he called it, which conferred unquestioned benefit on Ireland, but was administered by methods so harsh that Wentworth came to be cordially hated in the island.

Returning to England in 1639, he was created Earl of Strafford and consulted by the king on all important questions. The Presbyterians of Scotland had become troublesome, and Strafford advised the king to make use of Irish troops against them, and to assert his royal prerogative in every possible way. When the Long Parliament met in November, 1640, it at once determined to impeach Strafford for his administration of Ireland, and the king summoned him to London, promising that he "should not suffer in his person, honour or fortune." Parliament dropped the impeachment, for which there was insufficient evidence, and in May, 1641, passed a bill of attainder, action being hurried by the discovery of a plot of the king's to rescue Strafford by force. The unfortunate statesman released Charles from his promise, and the king signed the bill on May 10. Two days later Strafford was executed.

**Sought His Country's Good.** It was long the fashion to sneer at Strafford as a turncoat and traitor, but a careful study of his life shows that he was in all things true to his convictions and acted for what he conscientiously believed to be the good of his country. A.MC C.

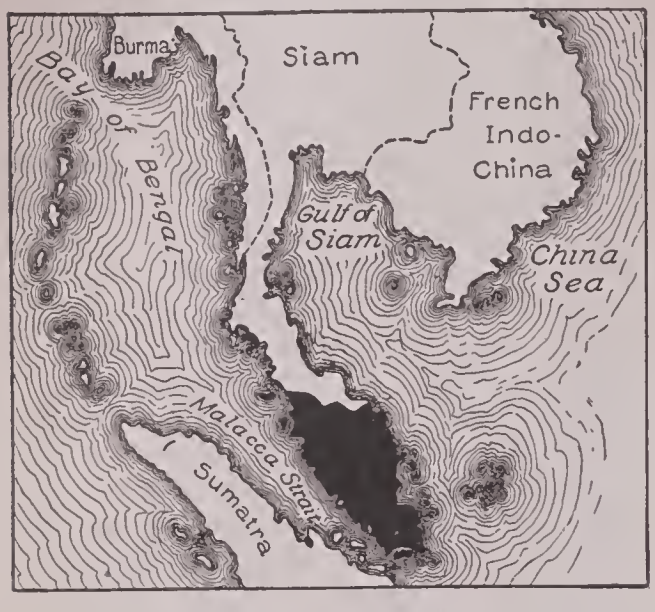
The events with which Strafford was connected led to the COMMONWEALTH OF ENGLAND, which see. Consult Forster's *Strafford,* in Statesmen of the Commonwealth Series; Browning's *Strafford.*

**STRAITS SETTLEMENTS,** the British possessions on and adjacent to the southwestern part of the Malay Peninsula other than the Federated Malay States (see map of Asia, opposite page 417). They are so called from the straits (Malacca) that separate the peninsula from Sumatra. The colony includes the three settlements of Singapore, Penang and Malacca. It has a total area of about 1,600 square miles and a population estimated in 1914 to be 761,521. There are about 8,000 whites; the Asiatic inhabitants are chiefly Chinese, Malays and natives of India.

Singapore is an island less than a mile from the southern extremity of the peninsula. In the Singapore settlement are included also the Cocos Islands, a small group of coral islands 1,200 miles southwest of Singapore; and Christmas Island, 700 miles east of the Cocos group.

Penang settlement consists of the island of Penang, off the west coast of the peninsula, a

strip of land opposite the mainland (Province Wellesley), and the Dindings, consisting of the small island of Pangkor off the west coast and a corresponding strip of mainland territory. Malacca is situated on the western




THE STRAITS SETTLEMENTS
(In Black.)

coast of the peninsula between Penang and Singapore. (Singapore, Penang and Malacca are described in these volumes under their respective titles.) Singapore, on the island of that name, and Georgetown, on Penang, are the chief ports, and from them are shipped vast quantities of tin, spices, rubber, gum, rattan, coffee and other tropical products. The capital of the Straits Settlements is Singapore. The colony has been under the administration of the British Colonial Office since 1867.

**STRAMO'NIUM,** a poisonous, ill-smelling weed of the nightshade family, whose seeds and leaves have medicinal value. Other names for it are *Jimson weed, devil's trumpet, stinkweed* and *thorn apple*. It abounds in fields and waste spots, the forked yellow-green stems often reaching a height of five feet. It bears heavily-scented, white, trumpet-shaped flowers, and smooth, green, sharp-pointed leaves, from three to eight inches long. Prickly, burlike pods contain tiny, wrinkled, black seeds, which, like the leaves, are used in making the drug called stramonium. This drug is similar to belladonna (which see) in properties and is used principally for the relief of asthma. The plant is widely distributed throughout the warmer parts of the world. Children should be cautioned not to put its poisonous seeds, leaves or flowers in their mouths.

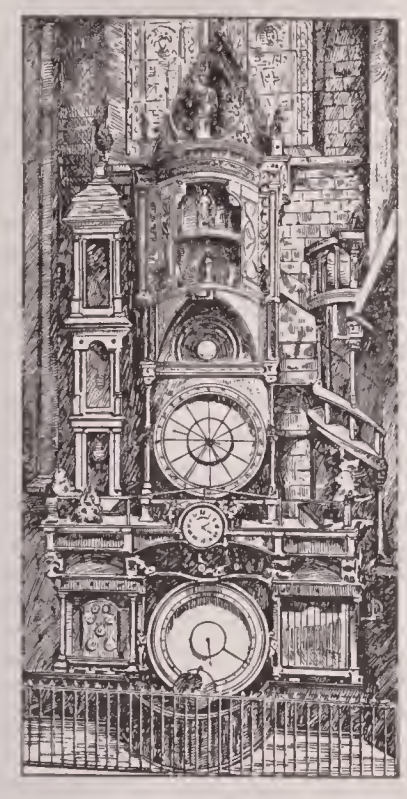
**STRASSBURG,** *shtrahs'boorK,* a university city of Germany, whose fortifications, vastly strengthened since the city's annexation to Germany in 1871, are among the most powerful in the world. Strassburg is the capital of the present German Imperial territory of Alsace-Lorraine, and it is situated on the Ill River, 300 miles east of Paris and 370 miles southwest of Berlin. Its most celebrated building is the cathedral, or minster, from the tower of which a splendid view of the city and its environs may be obtained. This church, famous for its clock (see subhead below), was begun in the eleventh century but was not completed until the fifteenth century. It is one of the finest specimens of Gothic architecture in existence. The university, founded in 1621, was formerly noted for its branches of medicine and philology; in 1872 it was reorganized as a German institution and greatly enlarged. Its library, destroyed by bombardment in 1870, during the Franco-German War, has been replaced by a new collection which now numbers over 1,000,000 volumes.

In the older parts of Strassburg are many fine examples of medieval houses and other buildings adorned with beautiful carvings. The public park, called the Orangerie, is famous for its orange and palm houses. Strassburg is connected by canals with the Rhine, and its situation near the borders of France, Germany and Switzerland gives it many commercial advantages as well as great strategic importance. Among its leading manufactures are tobacco, musical instruments, machinery, leather and fancy articles.

Strassburg was colonized by the Romans, who called it *Argentoratum*. In the sixth century its name was changed to *Stratisburgum,* and it became a free town of the old German Empire in the thirteenth century. In 1861 the city was united with France, but at the close of the Franco-German War, with all of Alsace-Lorraine, it again was annexed to Germany. During the War of the Nations the city was bombarded by allied airships. Population in 1910, 178,891.

**Strassburg Clock.** This famous astronomical clock is thirty feet high and fifteen feet wide at its base. The large globe of the heavens at the bottom shows the course of the stars. Behind it is a perpetual calendar indicating the day of the month and all religious festivals. Above are many automaton figures, one of which is drawn across the platform each day; figures representing infancy, youth, old age and death strike the quarter hours in turn. Above the dial is a complete planetarium surmounted

by a globe which shows the phases of the moon. Every noon twelve apostles come forth and pass in procession before a figure of Christ, which tops the clock, while a cock crows at stated intervals. About this time each day a crowd is always seen near the cathedral, for the people never tire of listening to the crowing cock or of watching the procession of the apostles. The mechanism of this clock was constructed in 1839-1842; the device replaced another equally famous clock made in the sixteenth century. There was still another and earlier clock, which was set up in 1352. R.D.M.



THE CLOCK

**STRATEGY,** *strat'e ji,* the art or science of so leading an army that it may go into battle under the most favorable conditions. The word is derived from the Greek *strategos,* meaning literally, *the art of the leader or general.* Strategy may be exercised in defensive or offensive operations, but strategy, if defensive, can only avoid defeat, while offensive actions, although open to defeat, have victory as a definite possibility and incentive. Strategy can perhaps be somewhat simply defined as the art of properly employing an army as a whole; while *tactics* is the science that directs the movements of the subdivisions of the army.

Time is of the utmost importance in modern warfare, and the nation that has most carefully prepared for war beforehand will have achieved practical strategic results by being able to strike the first blow, the moral effect of which is always great. The first blow having been delivered, it is perhaps invariably a mistake to alter a previously-arranged plan of campaign until such alteration is literally compelled by the action of the enemy. The homely saying, "It's ill to change horses while crossing a stream," aptly illustrates the undesirability of alteration of plans.

In modern warfare in which each belligerent will try decisively to beat the opponent as quickly as possible, strategy will be most strongly exerted towards achieving a combination which will enable an overwhelming blow to be struck at the enemy's strongest point. One of the axioms of strategy is that an army can never be too strong to deliver a decisive blow, while it may readily find itself too weak to do so. Positions referred to as of strategic value possess that value to the holder only in that by holding them he is enabled to do or prevent the enemy from doing what he may seek to do. The seizing of important points and recognition of their full value, utilizing every possible advantage to the utmost, and taking from the enemy such advantages are the chief points of strategy. See TACTICS. F. ST.A.

Consult Altham's *The Principles of War;* Aston's *Sea, Land and Air Strategy.*

**STRAT'FORD,** a city in Ontario, the county town of Perth County. It lies on the Avon River, and is a divisional point on the Grand Trunk Railway, which maintains repair shops there. By rail Stratford is eighty-eight miles west of Toronto and eighty-one miles east of Sarnia. Shoes, woolens and chemicals are made here. The city has the county buildings, a collegiate institute and a provincial normal school. Population in 1911, 12,946; in 1916, estimated, 15,000.

**STRATFORD-ON-AVON,** a town in England visited by tourists from all over the world. As the birthplace of England's greatest poet—William Shakespeare—Stratford commands an interest out of all proportion to its size and importance. It is situated in the lovely valley of the River Avon, eight miles southwest of Warwick. The greater portion of the town lies on the west bank of the river, and the place is typically English, with pleasant streets, shade trees and old-fashioned houses.

The house in which the poet was born (see illustration in the article SHAKESPEARE) is preserved as a memorial and is open to visitors. Another interesting spot is the chancel of Holy Trinity Church, containing the graves of Shakespeare and his wife, Anne Hathaway. On the slab above the poet's grave the pilgrim may still read the curious rhymed epitaph beginning—

> Good frend, for Jesus sake forbeare
> To digg the dust encloased heare.

A drawing of this epitaph is shown in the article SHAKESPEARE. The Shakespeare Memorial, built on the river bank above the church,

is a pretentious building with a theater, a picture gallery and a library containing valuable books and manuscripts relating to the poet. In the memorial theater the F. R. Benson Company gave a series of performances in 1916, in commemoration of the tercentenary of Shakespeare's death. American tourists, over seven thousand of whom visit Stratford every year, contributed funds for the erection of a memorial fountain and a clock tower. At Shottery, a mile west of Stratford, is the quaint thatched cottage where Anne Hathaway lived, while the cottage of Mary Arden, mother of the poet, may be seen at Wilmcote.

Stratford is a market town and municipal borough. It is one of the oldest places in England, dating, probably, from the Roman era. In 1911 it had a population of 8,531.

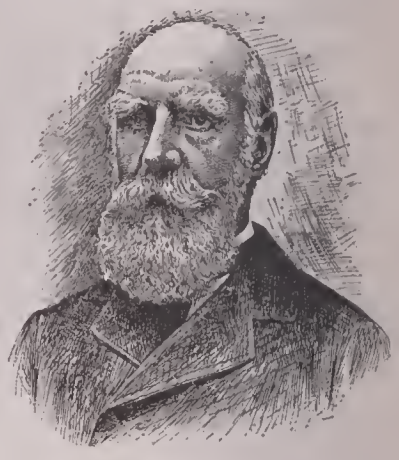
Consult Lee's *Stratford-on-Avon*; Savage's *The Registers of Stratford-on-Avon.*

**STRATHCONA AND MOUNT ROYAL,** Donald Alexander Smith, First Baron, (1820-1914), a Canadian fur trader, railway builder, financier and statesman, whose career is so closely interwoven with Canadian history that he defies classification and stands forth unique among Canadians of all time. His youth and middle life were devoted to the service of the Hudson's Bay Company and the upbuilding of the Northwest. He was fifty years old when he held his first political office. At sixty he became the chief promoter of the Canadian Pacific Railway, and for nearly a decade devoted himself to the task of financing this great organization. At seventy-six, an age when the average man is ready for the grave, he accepted the office of Canadian High Commissioner to Great Britain, and for nearly a decade more served his country with energy and ability.

In the years immediately preceding his death Lord Strathcona was a commanding figure wherever he appeared. His great age, his venerable dignity, his high reputation, combined with his vast wealth and his personal and official rank, set him apart from other men. Great as the offices were which Strathcona held, yet he always magnified them through his own greatness. Never did any office or power overshadow the man.

**With the Hudson's Bay Company.** Donald Smith was born at Forres, Morayshire, Scotland, but in 1838 left Scotland for Canada as a junior clerk in the service of the Hudson's Bay Company. For thirteen years he was stationed in Labrador. There, besides mastering the details of the fur trade, he gave much of his time to attempts at introducing improvements into the conditions of life. For example, he was the first to prove that potatoes could be grown there with success. Leaving Labrador in 1851, he spent the next decade in the Northwest, where he became in turn chief trader and chief factor. Ultimately he became chief commissioner of the company's fur trade, with headquarters at Montreal.

In 1874 he retired from active participation in the fur trade, exchanging the commissionership of that branch for the place of land commissioner. Thereafter the scope of his work and influence widened. He became the champion of the active traders, the "wintering partners," in their efforts to get fair treatment from the board of directors, and was himself elected to the board in 1883. Sir Donald (he was knighted in 1886) was already foremost in influence among all those connected with the company and in 1889 was formally elected governor, thus becoming in title, as in fact, the chief executive. Thus Donald Alexander Smith sat in the place once occupied by Prince Rupert, by King James II of England, and the great Marlborough.



LORD STRATHCONA

**The Northwest and Politics.** While thus rising in the councils of the Hudson's Bay Company, Donald Smith widened his field of activities. By virtue of his character, as well as his official position, he had a remarkable hold over the traders, the Indians and the half-breeds of the West. He had traversed the West in summer and winter, was familiar with its resources in men and materials, and was known to all. During the disorders in the Red River valley in 1869 and 1870 he acted as special agent for the Dominion government, and but for his courage and tact the uprising would have been far more serious than it was.

In 1870, on the organization of Manitoba as a province, Smith was elected to the Manitoba assembly as a Conservative, and in the same year was appointed to the Council of the Northwest Territories, and was elected for Selkirk (Man.) to the House of Commons. He resigned his seat in the assembly in 1874, as a

result of the prohibition of dual representation, but remained in Parliament until 1880. He again sat in the House of Commons as member for Montreal West (he had in the meantime moved from Winnipeg to Montreal) from 1887 to 1896.

**The "C. P. R."** The interval between these two periods of service in the Dominion Parliament, Smith devoted to the Canadian Pacific Railway, which owed its successful completion no less to his vision of the future and his ability as a financier than to the executive capacity of Sir George Stephen and the assistance of Sir John A. Macdonald. Stephen (later to be Baron Mount Stephen) and Smith already had experience with railways, for, together with James J. Hill, they acquired control of a bankrupt road in Minnesota out of which has grown the Great Northern Railway. When the time came to award the contract for the construction of a transcontinental railway, Smith's name did not appear in the list of members of the syndicate because of a recent political quarrel between him and Sir John Macdonald. But it was not long before Smith was recognized as one of the chief factors in the company, and when the line was actually completed it was Smith who drove the golden spike which marked the end of the work. This was on November 7, 1885, and on June 28, 1886, the first through train left Montreal for the Pacific. For his share in the work, Smith was rewarded with the nomination as Knight Commander of the Order of Saint Michael and Saint George.

**High Commissioner in London.** During his second term of service in the House of Commons, from 1887 to 1896, Sir Donald (as he then was) was a conspicuous member, although he seldom addressed the House. Near the end of the period, when the Conservative party was falling to pieces, there were suggestions that he should assume the leadership of the party, and many believed that no other leader could save it from defeat. Sir Donald labored hard to effect some sort of unity, and to compromise the Manitoba school question, but he declined the leadership. Sir Charles Tupper was therefore called home to lead the Conservatives, and Sir Donald Smith was sent to London in his place as High Commissioner. He was raised to the peerage in 1897 as Baron Strathcona and Mount Royal.

Although an old man, he was extraordinarily active, appeared frequently in public and on state occasions, and became in England, as he had been in Canada, one of the most familiar figures in the public eye. The ambassador of the United States to Great Britain is an officer who has many responsibilities and many obligations. Yet one holder of this office, Whitelaw Reid, spoke of Lord Strathcona as follows:

> I sometimes think that my office is magnified by your kindness into a greater than it would be otherwise, and my duties, more numerous here from the same cause, would sometimes overwhelm me if my spirit of emulation were not aroused by the constant spectacle of a rival. He, too, is an Ambassador of an English-speaking Transatlantic country, in extent equaling my own and advancing by rapid strides to wealth and importance second only to ourselves in the whole Western world. Wherever I go there is he, and to a great many functions I do not go, he does. Yet, great as is the country he represents, the Ambassador of the Dominion magnifies his office. Beside his indefatigable exertions, my own office is a sinecure.

**His Varied Activities.** Not only did Lord Strathcona labor in many fields at various times, but even at the same time. While he sat in Parliament, beginning in 1887, he was president of the Bank of Montreal, and he continued to hold this office even after he became High Commissioner. He was also a director or officer of many other financial and industrial organizations. He took a keen interest in educational problems, and was one of the first to advocate technical training along the lines afterward adopted by Sir William C. Macdonald. He was elected chancellor of McGill University in 1889, and lord rector of Aberdeen University in 1899. In 1900 he presented to the British government the famous troop of the "Strathcona Horse," a cavalry troop raised and equipped at his expense for service in the South African War.

Lord Strathcona's interest in education and in the welfare of people less fortunately situated than he took many practical turns. He gave $1,000,000 as a half of the endowment fund for the Victoria Hospital at Montreal, and later added another million. Royal Victoria College for Women, at Montreal, also received $1,000,000 from him, McGill University received over $2,000,000, and Yale, Aberdeen and other universities received smaller amounts. His private donations to charities were countless. Old friends of pioneer days were never forgotten when they fell upon evil days, and many who had no claim on him knew the greatness of his generosity. Sir Wilfred Grenfell, the famous Labrador missionary, tells that he found Lord Strathcona one Christmas morn-

ing personally reading and sorting a stack of several letters containing appeals for help. Dr. Grenfell also tells the following story, characteristic of Lord Strathcona's many private benefactions:

On one occasion Lord Strathcona was asking me about old Labrador acquaintances, and as it was then fifty years since he had left the coast, it might have been expected that, with all his multiplicity of interests, he would long before have forgotten the individuals. He happened to ask after a certain woman who had been his servant so many years before. I told him that she had long ago passed away, but that her daughter, who was married and had a very large family, had often spoken of her mother's connection with him. He asked how she was faring with so many children, but appeared to take very little notice when I told him that the family were having hard times. However, the next time I visited that part of Labrador I heard that he had sent a special Labrador order of pork, flour, molasses, butter, and many outfits of clothing for herself and the children. To this day the woman is wondering "where on earth that winter's diet and all that clothing could have come from."

No sketch, however brief, could do justice to Lord Strathcona without special reference to his wife. During their married life of more than sixty years their devotion to each other was exceptional, and the frequent separations which were necessary because of Lord Strathcona's many interests never lost their sadness for them both. In 1913, only a few months before her death, she was at Glencoe, their Scotch estate, while Lord Strathcona was in London. He was then in his ninety-third year, but every evening he personally went to the telegraph office to send her a message. A thousand other messages he could turn over to a messenger, but this one message no one but himself was allowed to handle. She died in November, 1913, in her eighty-ninth year. Lord Strathcona survived her loss only ten weeks, his death occurring on January 21, 1914. W.F.Z.

Consult Willson's *The Life of Lord Strathcona and Mount Royal;* Preston's *Strathcona and the Making of Canada.*

**STRATIFIED, ROCKS.** *strat'i fide,* Slate, mica, shale and sometimes limestone are formed in layers and can be split into thin pieces. These layers are called *strata,* and rocks formed in layers are *stratified* rocks. Stratified rocks have been formed by sediment, which was first mud and then became hardened into rock. As originally formed, the layers were horizontal, but by folding of the earth's crust they have, in many places, been thrown out of their former position, and are in many different positions, from the horizontal to the vertical. The angle of inclination which these layers form with the horizon is called the *angle of dip.* See DIP.

**STRAUS,** *strous,* OSCAR SOLOMON (1850- ), an American public official who has been identified with the diplomatic service, the world peace movement and the arbitration of labor disputes, and been active in other notable lines. He is of German birth and ancestry, a native of Otterberg in Rhenish Bavaria, and is the brother of Isidor (a *Titanic* steamship victim) and Nathan Straus, both well known for their interest in humanity. Oscar Straus was brought to America when he was four years old. He was graduated at Columbia University and Columbia Law School and later engaged in the department-store business in New York. From 1887 to 1889 he represented the United States in Turkey, and was again minister to that country under President McKinley, from 1897 to 1900.

In 1902 Straus succeeded Benjamin Harrison as a member of the Permanent Court of Arbitration at The Hague. President Roosevelt appointed him Secretary of Commerce and Labor in 1906, and in 1909-1910 he served as ambassador to Turkey. In New York state he has taken an active interest in various fields of public work. An ardent supporter of progressive principles, he joined the Progressive party in 1912 and made an unsuccessful campaign for the governorship of New York. In 1914 he was chairman of the arbitration commission that settled a wage dispute between the heads of the Eastern railroads and their engineers, and the following year he became chairman of the New York State Public Service Commission (first district). He is the author of several books, including *The Origin of the Republican Form of Government in the United States, Reform in the Consular Service, The Development of Religious Liberty in the United States* and *The American Spirit.*

**STRAUSS,** *strous,* DAVID FRIEDRICH (1808-1874), a German theologian and writer, born at Ludwigsburg, near Stuttgart. While at the University of Tübingen he came under the influence of the philosophy of Schilling, Schleiermacher and Hegel.

In 1830 he became assistant pastor in a country congregation, and soon was made professor of history, Latin and Hebrew in a seminary at Maulbronn. The following year he went to Berlin, with plans to study under Hegel and Schleiermacher. The former died just after he arrived, but Strauss was a faithful attendant

at the lectures of the latter for a short period of time, then returned to lecture at Tübingen, where his attacks on Christianity aroused wide comment. In 1835 appeared his most famous work, *Das Leben Jesu* (Life of Christ), in which he presented his theories of the origins of Christianity and explained the Gospel history on mythical grounds. Later publications provoked such a storm of protest that his appointment to a position in the University of Zurich was recalled.

He married Agnes Schebest, an opera singer, in 1841, but the two separated after five years. In 1848 Strauss was made a member of the Württemberg Chamber, and being a conservative in politics soon resigned. From that time he lived a wandering life, writing critical biographies and theological treatises in which he revealed his complete abandonment of the principles of Christianity for those of modern science. His biographical writings include *Schubart, Märklin, Ulrich von Hutten* and *Voltaire*.

**STRAUSS,** Johann (1825-1899), an Austrian composer, was born at Vienna. His father, Johann Strauss, was a well-known composer, the first to elevate dance music, especially the waltz, to an artistic plane, but he was bitterly opposed to his son becoming a musician. The boy's mother, however, paid for his instruction on the violin; when he was nineteen years of age he left home to conduct a restaurant orchestra at Hietzing, Austria. There he began to present his own compositions, mainly waltzes, and the restaurant soon became crowded with admiring listeners. In 1849, after his father's death, he united his own orchestra with that of his father and began a series of tours of Europe. Everywhere he appeared he received great praise for the grace and beauty of his original dance music.

In 1855 he became conductor of summer concerts in Saint Petersburg (now Petrograd) and from 1863 to 1870 was conductor of the Russian Court balls. His last days were spent at Vienna, where he died on June 3, 1899. His five hundred dance compositions have won him the title of the Waltz King. Among the most noted are *Beautiful Blue Danube, Artist's Life, One Thousand and One Nights* and *Wine, Women and Song*. He composed also several successful operettas, among them *Indigo, A Night in Venice* and *Prince Methusalem*.

**STRAUSS,** Richard (1864- ), a German composer, was born at Munich. His father, Franz Strauss, was one of the greatest horn players of Germany, and Richard Strauss as a small boy showed marvelous musical talent. He was a good pianist at the age of four, a composer of music worthy of publication at six and an advanced student of musical theory and composition at ten. Before he was sixteen years old his songs were becoming well known and his *Symphony in D Minor* was being played by several eminent pianists. Even Bülow, who was a merciless critic, praised his work and had his *Serenade* performed at Meiningen, Germany. In his early manhood Strauss gained further notice by his numerous compositions for voice and piano, but he had not yet found his true sphere and showed too greatly the influence of other composers.

Bülow awakened his genius by pointing out the tendency of modern music away from mere beauty of melody and harmony to realism and absolute truthfulness. About 1885 Strauss began to profit by this suggestion and commenced to produce the unique and often highly realistic compositions for which he is now noted. In that year he became a conductor in the Munich opera and in 1889 received the position of chief conductor at Weimar, Germany. He returned to Munich in 1894 as chief conductor, and in 1899 accepted a similar position in Berlin. Storm after storm of criticism, ridicule and abuse followed the appearance of new works by Strauss, for apparently he broke with the traditions of music. In such a work as *Till Eulenspiegel* he introduced the spirit of humor to such an extent as to make some portions a source of hearty laughter, and this naturally has shocked the musical sentimentalist. In *Don Quixote* he became so realistic in his descriptions that some romantic lovers of music could discover very little harmony in it. His *Domestic Symphony,* describing the ordinary sounds and scenes in the kitchen and dooryard of a home, aroused international discussions.

Strauss has not hesitated to use music for satirical purposes, and his opera *Feuersnot,* an amusing yet biting satire on musical and social conditions in Munich, is a conspicuous example of his success in such efforts. His greatest operas, however, are *Elektra* and *Salome,* works of exceptional beauty and brilliance, but so realistic as to repel many of the more old-fashioned lovers of music. His songs, however, are often full of delicate sentiment and exquisite charm. No man in musical history has been more discussed, for he undoubtedly has greatly broadened the scope and subjects of composition and has shown originality. R.D.M.

Consult Huneker's *Mezzotints in Modern Music;* Newman's *Richard Strauss.*

**STRAW,** which consists of the dried stems of oats, wheat, rye, barley and other grains, has a wide range of usefulness. In the manufacture of paper, baskets, saddles, bottle covers, strawboard, suit cases and hats it figures importantly, but hat making is undoubtedly the greatest straw industry. In America it is carried on chiefly in Massachusetts. Foreign centers are in China, Germany, Austria, France, Switzerland and Italy; in Bohemia and Saxony there are probably between 20,000 and 30,000 persons engaged in making straw hats. The most exquisite work is done in Tuscany, where leghorn braids are made from a special kind of straw.

Wheat is the most desirable grain for hat straw. The stems are pulled up, as mowing would injure them. When cut in proper lengths they are bleached in the sun, stripped of the outer layer, bleached again with sulphur and sorted with regard to size and color. Even though looms have been invented for straw-weaving, much of the work is still done by hand. Straw is also used as filling for packing cases, food and bedding for farm animals, and an ingredient of fertilizer. Panama hats are not made of straw, but from the leaf fiber of a species of palm.

**STRAWBERRY,** *straw'ber i,* a luscious red fruit, grown on a plant which is one of the most popular members of the rose family. The plant is a trailing vine whose leaves are borne in clusters of three. One can easily understand why Macaulay exclaimed, on his return from India, that he would gladly trade all the fruits of the Orient for a single basket of strawberries. Just as its relative, the rose, queens it over the rest of the flowers, so the strawberry lords it over the other berries. The domain over which it reigns in America, where it is more extensively cultivated than any other small fruit, stretches from Mexico to Alaska, from New England to the Pacific coast. It is at home in every province of Canada, in Europe, in South America; and wherever it grows it is a favorite

THE STRAWBERRY
Plant: blossom, leaves and fruit.

THE STRAWBERRIES OF A YEAR
The figures represent the yield in average years in the leading American states and Canadian provinces.

on account of its delicious flavor, delicate aroma and rich beauty.

As a matter of fact, the strawberry is not a berry in the technical sense, for it lacks the outer skin enclosing seeds and pulp that distinguishes true berries, like currants and huckleberries. It is a fleshy, swollen seed receptacle bearing the dry, yellow seeds upon its pitted outer surface; the star-shaped hull that is removed before the berry is eaten was early in the season the calyx of the blossom. Not every blossom will produce fruit, for some lack stamens and need to be grown in the neighborhood of staminate plants, so their seeds may be fertilized by the pollen. See CROSS-FERTILIZATION.

**Cultivation.** It is the youngest plants that give the best quality and quantity of fruit, and some growers permit their vines to bear but once or twice. Young plants should always be used in "setting" a bed. Both spring and fall planting are practiced, but if the climate is severe fall planting necessitates a great deal of attention in the way of covering the bed. Very large and fine fruits are obtained by planting in hills and cutting off the runners, but usually strawberries are set in rows and the runners allowed to mat. In the row the plants are from fifteen to eighteen inches apart, while the rows themselves have three or four feet between them, to allow room for cultivation.

Any good garden soil is suitable for strawberry growing, but the richer the soil the larger the crop, and fertilization is usually necessary

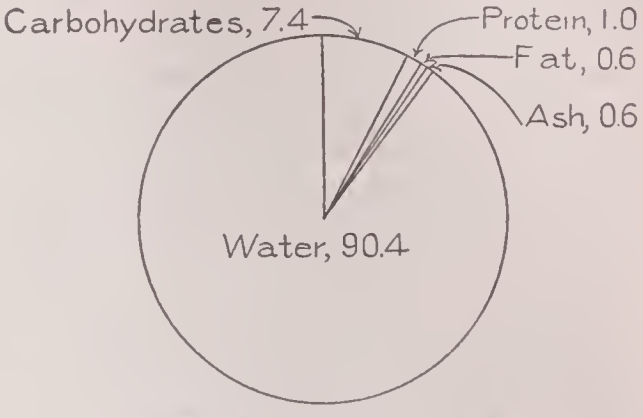
after the first heavy bearing. Rotation of crops is generally practiced by commercial growers. One authority gives this advice:

The strawberry is a cold-blooded plant, and is never at its best in a very warm place. A northern slope is more favorable, other things being equal, than a southern one. Land that has been grass within a year or two is to be avoided, on account of the probable presence of white grubs in it. So also land that has been in strawberries within a year is liable to contain insect enemies or rust spores. The best results cannot be secured where water stands for weeks within a foot of the surface, during the growing season. People are not generally aware also that large trees near a strawberry bed are very injurious, on account of the water they take from the soil.

The ideal preparation is first to drain and grade the bed, in the fall. Then cover the surface with manure; and in the spring rake off all trash; and then make fine the soil to the depth of six inches. . . . . If one has any doubt about the fertility of land, in the spring, just before the plants come into bloom, apply a few hundred pounds of a good fertilizer per acre. Two hundred pounds of nitrate of soda, when about half the fruit has set, will add to the crop and to the luxuriance of the plant. I am satisfied from long experience that a good coat of manure applied in the winter is one of the best methods to get a good crop of strawberries. Lime should never be used on land for strawberries, nor a very large amount of unleached wood ashes.

Strawberries require a great deal of water, and when the rainfall is insufficient some form of watering must be resorted to. In a home garden bed this can be accomplished by digging holes every two feet in the row and pouring from one to two quarts of water into each hole. To prevent evaporation, draw a little dry earth over the moistened place. As sprinkling merely moistens the top soil and causes the ground to cake, it is not a satisfactory method of supplying water. Moisture can also be conserved by continual stirring of the soil, for this cultivation causes the top layer to act as a mulch and prevents the escape of moisture from below. Commercial growers resort to irrigation, by which the water is distributed through the fields in a series of V-shaped troughs.

**Strawberry Enemies.** The strawberry is attacked by several insect pests and by various fungoid diseases. Among the latter is blight, or rust, which forms small purple spots on the leaves. Bordeaux mixture (see INSECTICIDES AND FUNGICIDES) is a standard remedy for all fungoid diseases. Destruction of affected plants and the burning over of old beds are recommended as aids in fighting grub insects. The strawberry weevil, especially troublesome in the Southern states, is a small black beetle that preys on buds and blossoms. It may be destroyed by applications of white hellebore and kerosene emulsion. Kerosene emulsion is also




FOOD ELEMENTS IN THE STRAWBERRY

recommended for killing the strawberry leaf roller, a small, yellowish caterpillar that attacks the leaves. L.M.B.

For illustration of other members of the Rose Family, see page 5081. Consult Fletcher's *The Strawberry in North America;* Terry and Root's *A B C of Strawberry Culture.*

**STRAW PLAIT,** *playt,* braided or plaited straw, employed in making hats, mats and numerous small commodities. See STRAW.

**STREATOR,** *stre'ter,* ILL., a city in La Salle County in the north-central part of the state, ninety miles southwest of Chicago and fifty-six miles northeast of Peoria. It is on the Vermilion River and on the Chicago, Ottawa & Peoria, the Atchison, Topeka & Santa Fe, the Burlington, the Chicago & Alton, the New York Central and the Wabash railroads. There is an electric interurban line to Chicago. The area of the city exceeds three square miles. In 1910 the population was 14,253; it was 14,304 in 1916 (Federal estimate). Interesting features of Streator are a Federal building, a Carnegie Library and parks. Near by are Starved Rock and Deer Park. The surrounding country is agricultural, and near the city are valuable deposits of coal and clay. The industrial establishments include manufactories of glass, bottles, brick and tile, sewer pipe, automobile accessories, carpet sweepers, metal specialties, garters and banana crates. Streator was settled in 1860, was incorporated as a village ten years later, and became a city in 1882. T.G.E.

**STRENGTH OF MATERIALS,** *ma te'ri alz,* a term used to indicate the resistance offered by such materials as stone, wood and steel to stresses tending to change their shape. In the construction of buildings it is necessary to select the material which will best withstand the particular stress to be exerted upon it. Ma-

terials differ greatly in this regard. Several sorts of stress are usually distinguished. There is a *tensile,* or stretching, stress, and resistance to this direct pull is known as tensile strength. *Compressive* strength is resistance to such crushing masses as pillars support. *Shearing* strength is resistance to forces acting transversely to the material. In addition to these there is a *torsional,* or twisting, stress, but this is really a combination of the larger classes first named. Still other stresses are occasionally distinguished.

Ingenious machines have been devised for testing the strength of materials, the strain applied being that to which the material will be most subjected when in place. Materials are said to have elasticity, and this limit of elasticity is not exceeded as long as the material resumes its shape when the stress is removed. When, however, the material becomes "set," it is said to have reached the *yield point;* and in building, the stress at the yield point, rather than the breaking point, is what concerns the contractor.

Steel and wrought iron offer the stoutest resistance to pulling strains. Wood, which does not suffer a great tensile stress, has what is known as a greater elastic range than steel or iron; that is, it bends more under a given pressure. The strength of wood depends upon its weight, the heavier woods being usually also the stronger. Most materials will withstand a severer crushing than pulling strain, but this is not true of wood. Cast iron will withstand a very heavy crushing strain, and for that reason it is commonly employed in the spans of bridges and in the foundations of modern buildings. The tenacity of materials is put to a harder test under twisting strains than any other. In order to combine strength with lightness, materials are often cast in hollow form.

The strength of materials can be expressed in figures with only a rough approximation to exactness, because the strength varies with different specimens. In engineering work, actual tests determine the fitness of any material to withstand the stress to which it will be subjected. The tensile strength of such woods as white oak and chestnut is about 12,000 pounds to the square inch; that of hemlock, red oak and white pine, about 8,000 pounds. The crushing strength of white oak is about 8,000 pounds to the square inch and that of the other woods mentioned between 5,000 and 8,000 pounds. Portland cement has a tensile strength of about 700 pounds to the square inch, and ordinary structural steel has a tensile strength of from 60,000 to 70,000 pounds per square inch. The table of estimates given below was prepared by William C. Unwin, an English authority on the subject:

STRENGTH OF MATERIALS, IN POUNDS, PER SQUARE INCH

| MATERIAL | TENSILE STRENGTH | CRUSHING STRENGTH | SHEARING STRENGTH |
|---|---|---|---|
| Cast iron | from 30,500 | 130,000 | 12,000 |
| | to 10,800 | 50,000 | 8,700 |
| Wrought iron bars | from 67,000 | 50,000 | 49,000 |
| | to 33,500 | (average) | 22,400 |
| Steel plates | from 65,000 | ..... | 50,000 |
| | to 110,000 | ..... | 83,000 |
| Steel boiler plates | 66,000 | ..... | 56,000 |
| Rivet steel | 65,000 | ..... | 55,600 |
| Copper, rolled plates | 31,000 | ..... | ..... |
| Copper, annealed wire | 45,000 | ..... | ..... |
| Brass | from 17,500 | ..... | ..... |
| | to 29,000 | ..... | ..... |
| Cast zinc | 7,500 | ..... | ..... |

Consult Merriman's *Strength of Materials;* Burr's *Elasticity and Resistance of the Materials of Engineering.*

**STRIKE,** the action of a body of laborers in ceasing work in order to force an employer to grant their labor demands. It has always been the chief weapon of labor organizations. When employees leave their work, not because of dissatisfaction with their own condition, but to make their employer bring pressure upon another employer whose laborers have already struck, their act is known as a *sympathetic strike.* A *general* strike, such as occurred in Italy in 1914, is a political protest participated in by all the laborers in a country. A *lockout* is the reverse of a strike; that is, it usually results from a strike and is the refusal of an employer to permit his employees to work until they have submitted to his terms.

Consult Sorel's *Reflections on Violence;* Adams and Sumner's *Labor Problems.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

Eight-Hour Day
Labor Organizations
Open Shop
Sweatshop System

**STRIND'BERG,** August (1849-1912), one of the foremost Swedish writers of modern times. His literary output is difficult to classify because it represents such a variety of interests and so many schools of thought. A man of extraordinary mental energy, he was constantly stimulated by a craving to investigate new in-

tellectual fields. Strindberg was the son of an obscure tradesman of Stockholm. He studied at Upsala University, but left that institution without taking a degree. Thereafter he taught, engaged in newspaper work, tried his skill on the stage and was otherwise busy. In 1878 he produced his first important play, *Master Olof,* a work of value because it started a revolt against time-honored traditions in Swedish literature. The next year appeared his novel *The Red Room,* which revealed his gift for sarcastic expression of opinion and realistic description.

AUGUST STRINDBERG

Once started on his literary career he worked with superhuman energy, and for two years (1895-1897) was idle because of a mental breakdown. At various times he was a realist, a romanticist, a skeptic and a mystic. He was also a zealous advocate of the theory that woman is inferior to man mentally, physically and morally. Strindberg's numerous writings include *A Fool's Confession* (autobiographic in character); *The Natives of Hemsö,* a novel of Swedish peasant life; *Fisher Folk; Utopias Realized,* a plea for Socialism; *Speeches to the Swedish Nation,* and the plays *Gustavus Adolphus, The Father* and *Lucky Pehr.*

**STRING'ER,** Arthur (1874- ), a Canadian poet and novelist, favorably known for his lyric verses no less than for his popular detective stories and works of fiction. Stringer was born at London, Ont., and was educated at the University of Toronto and at the University of Oxford. Returning to America he engaged in literary work, was an editorial writer for several years, and was later literary editor of *Success,* a magazine. His writings are voluminous; among them are *Watchers of Twilight; The Loom of Destiny; Lonely O'Malley; The Silver Poppy; Epigrams; Phantom Wires; The Wire Tappers; Gun Runner; Shadow,* and *Irish Poems.*

**STRONTIUM,** *stron'shium,* first found in the lead mines of Strontian, Argyllshire, Scotland, in 1781, is a pale yellow metallic element whose compounds occur in small quantities in rocks, soil and mineral waters. It is harder than lead, is ductile and malleable, that is, capable of being drawn into a wire and hammered into a sheet, and gives a brilliant crimson flame. Strontium and barium (which see) resemble each other very closely. Strontium hydroxide is used to extract sugar from molasses in the beet-sugar industry. The nitrate is used in fireworks because it colors a flame crimson. "Red fire" is a mixture of potassium chlorate, shellac and strontium nitrate. The chemical symbol for strontium is Sr. See Chemistry, subhead *Elements.*

**STRYCHNINE,** *strik'nin,* or *strik'neen,* a very bitter, poisonous drug with powerful stimulating properties, obtained from the seeds of the nux vomica (which see) and kindred plants. In doses one-sixtieth to one-fifteenth grain it is often prescribed as a tonic and stimulant, for it increases the flow of digestive juices, and directly affects the spinal cord, and indirectly the heart and lungs. One-eighth grain dose will kill a dog; three times as much causes spasms in man, and one grain is usually fatal. The symptoms—violent twitching, difficulty in swallowing, and convulsions, during which the body is bent backwards—appear in about twenty minutes, and death may result in two hours from suffocation or exhaustion. A stomach pump or an emetic should be used at once (see Antidote, page 282). The drug is deadly to all animals save a bird of the hornbill species which eats the seeds with impunity, and a mite that feeds on the plant. The chemical formula for strychnine is $C_{21}H_{22}N_2O_2$ (see Chemistry, subhead *Elements*). C.B.B.

**STUART,** *stu'ert,* Charles Edward (1720-1788), called the *Young Pretender, Bonnie Prince Charlie* and the *Young Chevalier,* was the eldest son of James Edward Stuart and the grandson of the deposed James II of England. James Edward, known as the *Old Pretender,* was the son of James II by his second wife. In 1745 Charles Edward made a determined effort to win back the English throne for the Stuart family. Although he was aided by the Highland clans of Scotland and gained some successes, there was no uprising in England in his favor, and in 1746 his army was defeated at Culloden Moor. The prince escaped to France, after many thrilling adventures. His life thereafter was one of dissipation, and was spent chiefly on the Continent. He died in Rome.

**STUART,** Gilbert (1755-1828), an American painter of the early national period, whose portraits of Washington are the most famous of all likenesses of the first President. Stuart executed at least forty portraits of Washington,

the first in 1795. Every one is familiar with the so-called "Athenaeum" head, showing the left side of the face. A full-length picture—*Washington at Dorchester Heights*—is also well known. Both of these are in the Boston Mu-

STUDIO OF GILBERT STUART
It was here, near Philadelphia, where he painted many of his Washington portraits.

seum of Fine Arts. The Metropolitan Museum, in New York, possesses the famous "Gibbs-Channing" portrait.

Stuart was born near Newport, R. I. He began to paint when a boy of thirteen, without any guidance, and though he had begun to accept commissions before 1775, he had little opportunity to study under good masters until that year, when he went to London. Between 1778 and 1782 he lived and worked with Benjamin West, his countryman. After winning a name in London and Dublin as a fashionable portait painter, he returned to America, his chief reason for this move being his desire to secure Washington as a sitter.

Stuart painted the first Washington head in Philadelphia. Later he lived in Washington. and in Boston, and he died in the latter city. While in Europe he painted George III and the future George IV, Louis XVI of France, Sir Joshua Reynolds, Benjamin West and the famous actress, Mrs. Siddons. Among other sitters were the four Presidents following Washington, also John Jay and Jerome and Madame Bonaparte. His paintings are notable for their purity and delicacy of coloring, and he succeeded in representing the personality of his subject with force and accuracy.

**STUART,** House of, a royal dynasty of England and Scotland, the members of which in theory and practice were exponents of the principle that "the king can do no wrong" (see Divine Right of Kings). The first Stuart to rule over England was James VI of Scotland, son of Mary Queen of Scots. In 1603, on the death of Elizabeth, last of the House of Tudor, James ascended the throne of England as James I, thus bringing the two countries under one sovereignty. His successor, Charles I, ruled so despotically that he was deposed and beheaded and a commonwealth was established (1649). In 1660 the family was restored to the throne in the person of Charles II, son of Charles I. In 1685 James II, brother of Charles, became king. He applied the divine right theory so recklessly that in 1688 he was deposed by a bloodless revolution, and the crown was bestowed on his daughter Mary and her husband, William of Orange, the two becoming joint rulers of the kingdom. In 1702 Anne, sister of Mary, succeeded to the throne. She was the last ruler of the Stuarts. In her reign Scotland and England were united. See genealogical table on next page.

**Related Subjects.** The following articles in these volumes deal with Stuart rulers or pretenders:

| | |
|---|---|
| Anne | Mary, subhead *Mary II* |
| Charles I and II | Stuart, Charles Edward |
| James I and II | William III |

**STUART,** James Ewell Brown (1833-1864), a dashing cavalry officer in the Confederate service during the War of Secession. He was born in Patrick County, Virginia, was a student in Emory and Henry College, and was graduated in 1854 at West Point Military Academy. In 1857 his regiment was sent to Kansas to enforce order, and he also saw service against the Cheyenne Indians. He resigned from the Federal army in 1861, when Virginia seceded, and was commissioned lieutenant-colonel of Virginia troops, first winning distinction at the first Battle of Bull Run. After the Battle of Fair Oaks, when Lee was preparing a vigorous attack, Stuart with 1,200 Confederate horsemen went around McClellan's army in order to learn the strength and location of the Union forces. He was commissioned major-general of cavalry in 1862, and during the Battle of Antietam made a raid into Pennsylvania. He aided Stonewall Jackson at Chancellorsville, and commanded that general's corps temporarily after Jackson's death. In the Wilderness campaign Stuart was successful in several engagements. He was mortally wounded at Yellow Tavern in 1864, in attempting to check the advance of Sheridan against Richmond.

**STUCCO,** *stuk'o,* a term applied to various compounds used for interior decorating and as

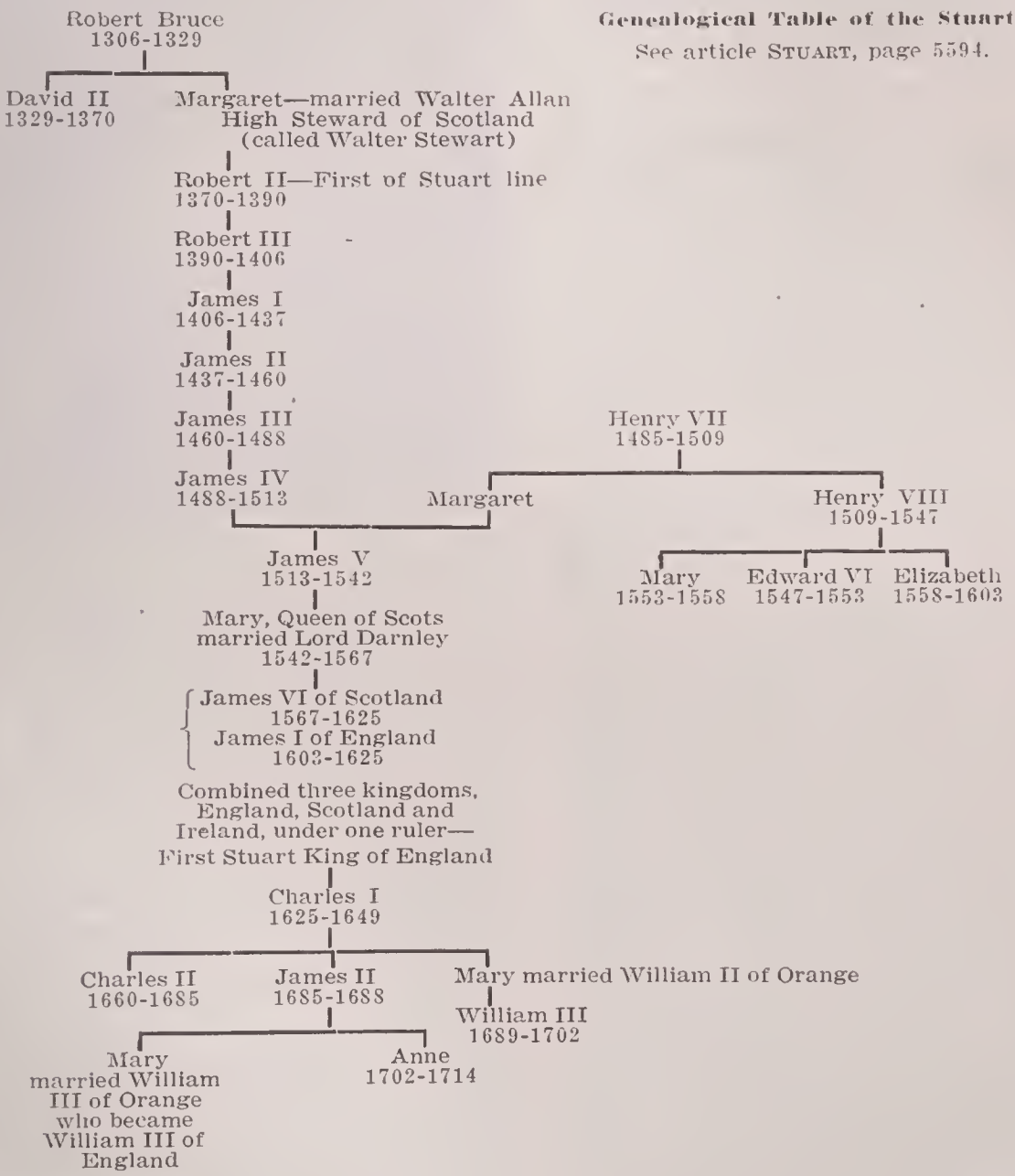
a surfacing for the exterior of buildings. That used for inside decorating is a fine plaster composed of gypsum and glue water or of pulverized white marble and fine sand, gypsum and water. It lends itself readily to polishing and finishing and gives beautiful effects. Imitation marble is a form of stucco. Stucco was employed quite generally by the Greeks and Romans as a decorative medium, and they often

position buildings is known as *staff* (which see).

**STURGEON,** *stur'jun,* a group of large fish inhabiting fresh waters and seas of the north temperate zone, caught for their flesh, which is usually smoked, and for their eggs, which are used in the preparation of caviar (which see). From the bladder of the Russian sturgeon a superior quality of isinglass is obtained. These

**Genealogical Table of the Stuarts**

See article STUART, page 5594.

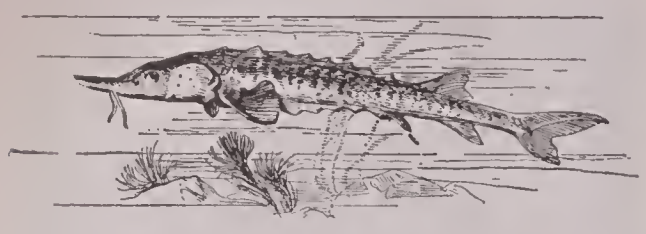



shaped it while plastic to form designs in relief. Exterior stucco is much coarser and contains a considerable amount of cement. It is now used very extensively as a surfacing material for modern houses, both for bungalows and for large and pretentious homes. It has the advantages of being durable and attractive, and it is much less expensive than stone. A cheap form of plaster used in the construction of ex-

fish have slender, elongated bodies covered with rows of bony plates. There is a long snout, beneath which is a small, toothless mouth with thick, sucking lips. The head, like the body, is well protected with plates. A single dorsal fin grows on the back, and the tail is forked, the lower lobe being usually shorter than the upper. Most of these fish migrate from salt water into streams in the spawning

season, though some species are permanent denizens of fresh waters. Their food, consisting of small marine animals and plant life, is sucked into the mouth.

One of the best-known species is the *common* sturgeon, found in European waters and along



LAKE STURGEON

the American coast from Maine to South Carolina. In the United States the supply of this sturgeon is rapidly declining because of the indiscriminate slaughter of the fish which ascend the streams at spawning time. The largest specimens are ten feet long and weigh as much as 500 pounds. Other species include the *white* sturgeon of the American Pacific coast, the largest American fish of this group; the *lake* sturgeon, a denizen of the Great Lakes and of the Mississippi Valley waters; and the great Russian *beluga,* which sometimes reaches a weight of 3,000 pounds. This fish has furnished the greater part of European caviar. Another Russian sturgeon, the small *sterlet,* is also the source of this delicacy.

**STURM,** *shtoorm,* JOHANNES (1507-1589), one of the most influential educators of the sixteenth century. He was born in Germany, near Cologne, studied at Leyden and Louvain, and in 1536 was put in charge of the educational system of Strassburg. This he organized so successfully that it was copied by other cities in Germany and became famous throughout Europe. For forty-three years he was director of the Strassburg Gymnasium, which was founded by him, and he achieved especial distinction by reason of his careful graduation of its course of study. As an earnest advocate of the reformed religion he insisted also that education must have a spiritual side, and he came to be looked upon as the greatest educator that the Reformed Church had produced.

**STUTTGART,** *shtoot'gahrt,* a city of Germany, noted for its beautiful situation and fine streets, squares and buildings. Stuttgart is the capital of the kingdom of Württemberg, and lies 115 miles northwest of Munich. It is situated at an elevation of nearly 900 feet above the sea, not far from the Neckar River, and is surrounded by verdant hills covered with vineyards and woods. About it are many attractive suburbs. A handsome avenue, the Königstrasse (King Street), intersects the city diagonally, dividing it into the upper and the lower town. Most of the buildings are stately examples of Renaissance architecture; they include the royal theater, the palace of the crown prince, the royal public library, containing over 600,000 volumes, a collection of early paintings and a museum of antiquities, the new courts of justice, the palace of William II, and one of the finest railway stations in Germany. Handsome churches, art museums and educational institutions are numerous, and the city is beautified by statues, parks and gardens.

Stuttgart is the chief center in South Germany of the printing and book-publishing industry, and its manufactures are numerous and varied. They include furniture, carriages, paper, leather, jewelry, cigars and other commodities. There is a prosperous trade in cloth, hops and horses. The city was the birthplace of the philosopher Hegel. Population in 1910, 286,218.

**STUYVESANT,** *sti've sant,* PETER or PETRUS (1602-1682), the last Dutch governor of colonial New York, or New Netherland, as it was then called, was born in Holland. The exact place of his birth is not known, nor are any facts about his youth and education to be obtained. It is certain that he served as a soldier in the West Indies, and at the age of forty-two was director or governor of one of the colonies founded on those islands by the Dutch West India Company. Two years later he lost a leg while leading the Dutch against the Portuguese on the island of Saint Martin, and the company as a reward made him governor of New Netherland.

He arrived at New York in May, 1647, and immediately began to make enemies by his arbitrary methods. Undoubtedly, however, he restored order and business confidence and quieted the Indians, who had been treated without mercy by the previous governor, William Kieft. In 1650 he settled with the New England colonists the northern boundaries of the Dutch colony, and further aroused the wrath of his subjects by granting too much territory to the Puritans. Five years later he captured all of New Sweden, including the present state of Delaware, and made it a part of New Netherland.

Stuyvesant was unbending, and had unbounded confidence in himself. When in 1653 a convention of Long Island citizens demanded a share in the government, he replied: "We derive our authority from God and the Com-

pany, and not from a few ignorant subjects." In 1664 an English fleet ordered the surrender of the city and, after resisting a few days, Stuyvesant yielded, on September 3. He afterwards settled down on his farm, or *bouwerij*, part of

PETER STUYVESANT

From an engraving after the painting by Van Dyck. The original is owned by Robert Van Rensselaer Stuyvesant, New York City.

which is now known as the Bowery, in New York City. He died on this estate and lies buried in Saint Mark's Church. A beautifully-carved and inscribed stone built into the wall of the church covers his grave. Irving, in his *Knickerbocker History of New York,* has given Stuyvesant lasting fame. M.T.

Consult O'Callahan's *The History of New Netherland;* Abbott's *Peter Stuyvesant.*

**STYPTIC,** *stip'tik,* from a Latin word meaning *to contract,* is a term applied in medical practice to an agent that arrests bleeding by drawing together the surfaces of the injured blood vessel. Tannic acid and alum are examples of chemical styptics. They act by causing coagulation or clotting of the blood; the clots close up the mouths of the injured vessels and so stop the bleeding. There are a number of vegetable styptic remedies, such as oak bark, gallnuts and turpentine. C.B.B.

**STYX,** *stix,* in Greek and Roman mythology, the dreary and pestilential river that flowed seven times around Hades, the abode of the dead. Across it the departed spirits were rowed by the ferryman Charon, to the realms of Pluto, who assigned them either to the Elysian Fields or to the grim regions of Tartarus. A lofty waterfall in Arcadia was also known as the Styx. Its waters were supposed to be poisonous and its barren surroundings suggested the entrance to the lower world.

**SUBCONSCIOUS,** *sub kon'shus,* THE. About the term *subconscious* center many important phases of mental conduct. The realm of the subconscious includes the many motives, feelings and impulses that affect behavior without reaching full consciousness; it emphasizes the significance of a variety of the mind's occupations without which human nature, normal and abnormal, cannot be understood. Consciousness has arisen because it is necessary for certain higher types of reaction. If rightly disposed it is most helpful; if wrongly applied, it becomes harmful. Consider physiological functions: We have just as much awareness as is good, and no more. We attend just enough to the sensations accompanying eating to swallow our food; if we put too much attention upon swallowing, it suffers—hence the difficulty in swallowing a pill. We walk best when we walk naturally; one does not walk naturally (which means with a right distribution of consciousness) when coming in late at church or theater with the eyes of the assembly upon one. The stiff expression so often seen in photographs reflects the consciousness of having one's picture taken.

All this illustrates the delicate relation between consciousness and conduct. Overconsciousness of one's digestion makes the nervous dyspeptic; but the complex varieties of consciousness depend upon social training. The free "unconsciousness" of childhood gives way to increasing experience. The age of self-consciousness is physiologically determined; the shyness of young men in the presence of young women is deeply regulated by all the complicated reactions of sex.

A large share of acquired habits are given over to subconscious guidance. It is common to remark that, without observing, we cannot tell how we dress, how we know where to reach for the knob of a door, to manipulate a typewriter or a sewing machine. Yet at one stage of learning all these actions were slow, deliberate and conscious. It is equally common to

observe that these mechanisms on occasion run themselves. When a man upon touching his watch in dressing for the evening begins to wind it and then to undress and go to bed, we call the lapse a case of absent-mindedness, and say that he does this un(sub)consciously. When we mislay an article and try to think how and when we disposed of it, we are trying consciously to follow the clue of our subconscious responses. Such states are characteristic in that they show a division of attention. While dominantly attentive to one action, we carry on another inattentively. In extreme absent-mindedness sensations do not yield their normal report, and actions are performed without normal awareness of their regulation. The man who carried a closed umbrella under his arm in a rainstorm, because he was convinced that he forgot the article when he left home, ignored the sensations that in a normal state of consciousness he would have received from the umbrella, and yet he maintained the contractions of the arm-muscles necessary to hold the umbrella; these also were defectively perceived.

Absent-mindedness is a state of dissociation, slight or deep; at the slightest, it gives rise to confusion due to lax attention, such as the instance of the young lady in the train who was eating a banana when the conductor collected tickets, and threw her ticket out of the window and offered the conductor the banana peel. In more severe dissociations, it approaches a dream state or a trance. It appears spontaneously in sleepwalking; the sleeper is attentive to the line of action upon which he is bent, but inattentive to all else. To awaken him means to restore him to normal consciousness. It appears still more strikingly in hypnosis (see HYPNOTISM), in which the range of consciousness can be definitely controlled by suggestion. The hypnotized subject sees, hears and feels only what is related to the action suggested; his state is abnormal in that he ignores obviously present objects if it be suggested that they have disappeared. Upon awakening he may have no recollection of anything done in the hypnotic state.

Throughout this range of observations it is to be noted that subconscious processes are at work. They are at work constantly to facilitate habits; in speaking in public we focus the attention upon the ideas we wish to express, and the subconscious mechanisms take care of the formation of the words and their utterance. Some persons talk in their sleep, so subconscious has the regulation become. Though concentrated upon one central task, we are giving fractions of attention to our surroundings, to our bodily condition, to the engagements ahead and to the routine of daily life. The relations become more interesting in the unusual cases, such as automatic writing or crystal gazing. In the latter case the subject supports and clarifies the subconscious impressions, bringing to the surface what commonly is vague and near the edge of forgetfulness. Every mind is stored with vast accumulations of impressions which cannot be consciously commanded but which none the less contribute to the imagery, the ideas, the memories, that guide thought. The crystal gazer, also the hypnotized subject, can "tap the subconscious," as it were, more fruitfully, and thus raise the impressions to a conscious value.

The subconscious plays its part in the field of sensation, in the field of memory and the organization of knowledge, but even more strikingly in the field of action. The subconscious there becomes the sub-voluntary; or, more simply, some irregularity of action and report enters. When one finds on attempting to wind his watch that he has already wound it, or on reaching the house door at night to lock it that he has already locked it, the action and intention failed to be registered as usual. When persons are assembled about a table with their hands resting on it and solemnly maintain that no one exerted the slightest pressure, yet the table moved violently and even rose in the air, the actual contractions of their muscles are ignored. (They are ignored through the conviction—which acts as a powerful suggestion—that some outside force is responsible for the movement.)

Prejudice blinds to virtues and failings alike; it selects what it shall see; it also ignores movements and intentions. In a more subtle manner the same procedure determines mind reading (which see), which is really muscle reading. But the movements of the tables through the subconscious (ignored) contractions of the hands that rest upon it lack any intellectual expression; they proceed upon a powerful emotional interest. When, however, the hand is laid upon a small tripod and moves from letter to letter over an alphabet (ouija board) and thus spells messages in consecutive sentences (while still the sitter claims ignorance of intention or selection of movement), the performance has a more intricate meaning. For the ideas which guide the movements are also subconsciously inspired and regulated. If the instrument holds a pen-

cil and writes (planchette), the messages are more fluent, while in automatic writing the hand itself may write elaborate compositions seemingly without the full conscious direction of the writer. In all these cases the subconscious is the source of idea and expression.

Cases of this kind have always attracted attention. The most recent is that of "Patience Worth," which is a ouija board revelation. Poems, prose narratives, dialogues of an elaborate character with distinct literary merit and a quaint phraseology are recorded, and fill a volume of subconscious automatic production. The writer is unaware of the source of the ideas which are "incubated" and reach expression in this roundabout manner. They are ascribed to a foreign agency, and in most cases have reference to spirit origin (see SPIRITUALISM). Equally striking is the automatic and dramatic action in a trancelike state. The most remarkable of these likewise requires a volume for its record. The subject develops several cycles of impersonation. In one she is an Indian princess; in another an inhabitant of the planet Mars; in a third the reincarnation of Marie Antoinette. As a Martian she develops a language (founded upon French, which alone she knows) and describes the life on Mars. The interpretations are made through a "medium" (also personified) who is really the means by which the subconscious communicates to the conscious self. Upon awakening from this trance the subject is unaware of the drama that she has enacted.

It is suggestive that in such instances the subconscious, detached procedures do not affect the conduct of waking life. When this occurs, the normal life is disturbed, and we have cases of divided personality. One state with one set of memories, of tastes and inclinations, of desires and habits, is now in the ascendant; and again it falls away and another person with quite opposite character takes her place. Such is hysterical instability. The one state is in ignorance of what the other does; but it can be definitely established that the relation of the two states is such that what is conscious to the one is subconscious to the other. An avenue of communication may be found; and when the two "characters" may be reconciled and merged a cure takes place. The extreme to which states of conflict may be carried are almost incredible; but such instances cannot be summarized.

Cases of a different type are those reported from time to time in which a sudden lapse of personality ensues, and a man wanders from home, is unaware of his previous life, settles in a new region, possibly in the same occupation as he formerly exercised, or it may be in a very different occupation, then suddenly comes to himself, unfamiliar with his new surroundings and oblivious of his recent life. Such divisions of the personality—between functions retained and those lost—may afford a clue to the nature of the defect, but as frequently leave unexplained the exact injury that the brain has suffered. It is established that the set of memories in abeyance is really subconsciously retained; the two states react much in the manner of alternating personalities in cases of incomplete fusion.

Normal characters represent a useful support and relation of conscious and subconscious factors; abnormal characters represent the failure of such relation. Typically these result from conflict; and such conflict-motives have prompted the view of Freud and others that the subconscious is constantly seeking and achieving expression as unfulfilled wishes and incomplete repressions. It is held that a dream is such a procedure. It has one meaning at its surface in the incidents of the dream; and another deeper and latent in terms of desires that are suppressed and reach expression in disguise by the dream route when the conscious censor is asleep.

Every one harbors secret wishes, private hopes, imaginative ambitions—many of them suppressed by social training and the harsh conditions of existence—which form phases of character in conflict with the conscious life that commands. Hysterical cases of divided personality and inconsistency are but exaggerated and irregular instances of the same relation. Freud believes also that the lapses of absent-mindedness express a suppressed intention. The value of his theory lies largely in the search for such inner conflict which it has aroused in cases of nervous and mental trouble; for when once the subconscious source of irritation is found and made conscious, the conflict disappears. The use of the analyses of dreams and other mental states to determine the hidden source of conflict is called psycho-analysis. In a large number of cases the conflicts center about the life of sex, because this is at once a most powerful emotional realm and one concerning which society imposes rigid repressions.

However viewed, the realm of the subconscious—especially for the emotional life, but hardly less so for the intellectual—is of large

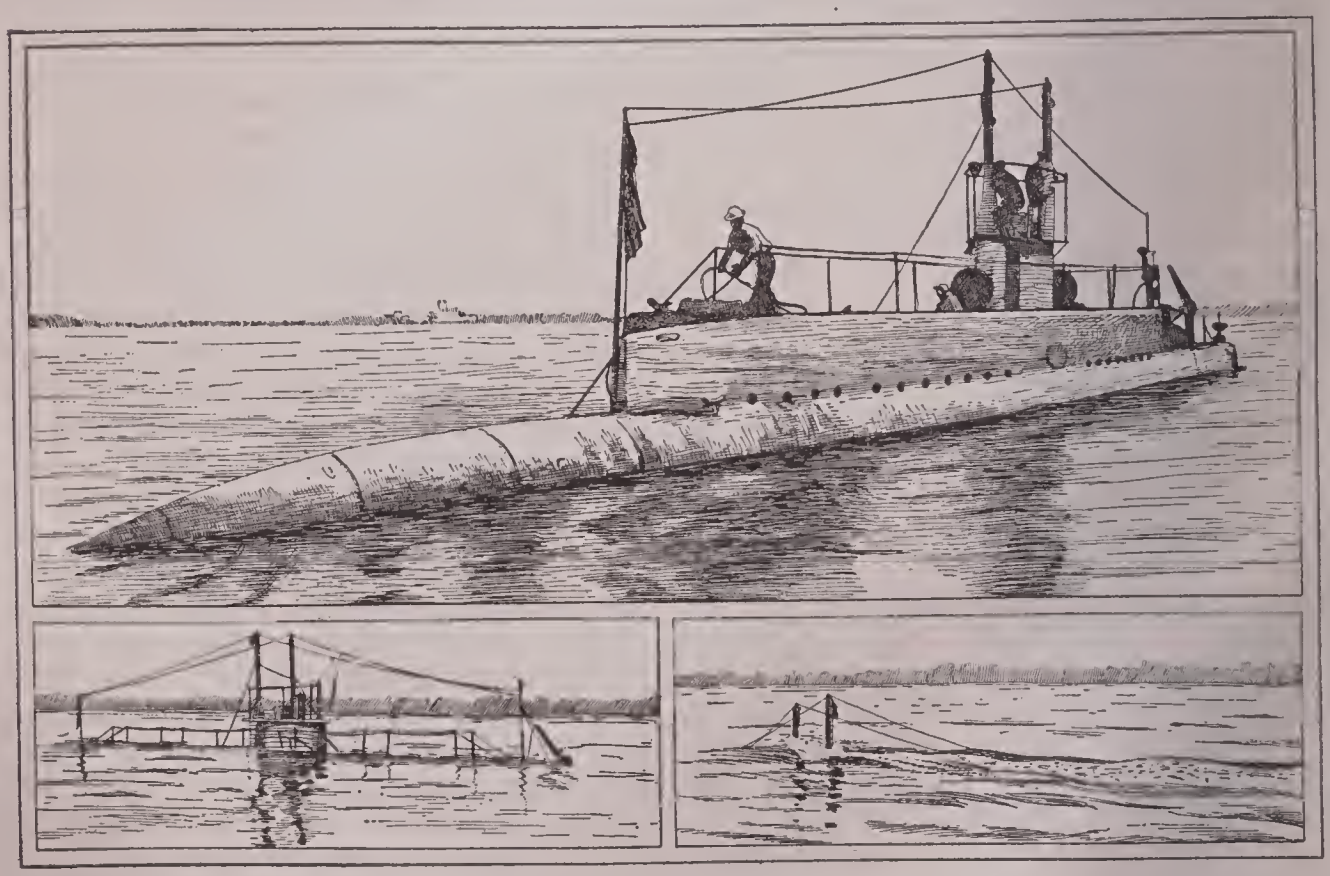
significance for the understanding of mental behavior. Both in its supports and in its conflicts the subconscious discloses the intimate sources of mental life. It must not be thought of as an independent or mysterious agency—a subconscious self that is a double of the self we know—but as an integral phase of the unified self that we recognize as the individual character. The abnormal cases, it is true, suggest independence and division; but the theory of dissociation establishes the gradual links from normal to abnormal that make clear that one relation is responsible for the whole series. Many points remain obscure, and the temptation to fly to extreme hypotheses is strong. It is part of the success of modern psychology to have rescued the realm of the subconscious from confused and superstitious views and to have brought it in line with the central facts of human nature. J.J.

**Relating to Various Beliefs.** The articles on the following topics, while all do not bear directly on the subject treated above, are of interest in this connection:

Alchemy
Astrology
Clairvoyance
Conjuring
Demonology
Divination
Faith Cure
Hypnotism
Magic
Medium
Mesmerism
Mind Reading
Necromancy
Occult
Palmistry
Phrenology
Physiognomy
Psychical Research
Psycho-Analysis
Spiritualism
Suggestion
Superstition
Telepathy
Theosophy
Trance
Witchcraft

**SUBLIMATION,** *sub li ma' shun,* the process of changing a solid substance into a vapor and then changing the vapor back to a solid without liquefying it. Sublimation differs from distillation in the changing of the vapor to a solid without the intervening liquid state. The product is known as a *sublimate.* Sublimation is used for purifying substances. In changing the substance to vapor the impurities are left behind and the pure substance is obtained. The flowers of sulphur, that is, the common sulphur of commerce, afford one of the best examples of a substance obtained by sublimation. The flowers of benzoin and salammoniac are made by this process. See DISTILLATION.

**SUBMARINE,** *sub ma reen',* a vessel which travels under water, but whose only practical use thus far in its history has been as a weapon of destruction. It ranks with the flying machine, a useful development of the arts of peace, as the newest implement at the disposal of warring powers. Except in warfare it has slight



THE MARVEL OF THE UNDERSEAS

Above, a submarine of the United States navy, of the latest type (1917), running at moderate speed. Below, at left, the same boat partly submerged, the conning tower and wireless appearing above water; at right, only the periscope shows above the surface.

From painting by Lieutenant Henri Farre, artist and aviator, in French Premier Groupe d'Escadrille de Bombardment. Reproduced by courtesy of the artist for THE WORLD BOOK.

**SUBMARINE DESTROYED.** In a calm sea a submarine is visible to the airman. A French aviator dropped a bomb from a height of 300 feet, striking the submarine seven feet behind the periscope. When the sea calmed after the explosion, parts of the submarine floated to the surface.

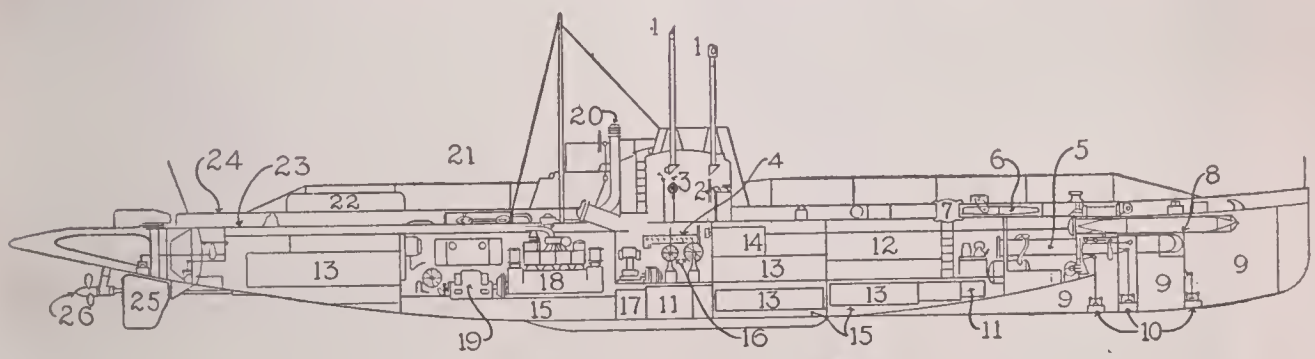
reason for existence. It is true that one submarine made two trips on commercial errands from Bremen, Germany, to Baltimore, Maryland, but these were occasioned by war conditions; such necessity would never arise in times of peace.

The modern submarine is the invention of John P. Holland, an American, but it remained for European nations to bring it to a remarkable degree of perfection and efficiency. To Germany is due the credit of developing an undersea fleet which became the terror of the seas; the United States, which gave this craft to the world, has made slight use of the marvelous invention.

**What the Submarine Is.** The submarine is a kind of mechanical fish. Though it is neither so comfortable nor so commodious as the ship described by Jules Verne in his engaging book, *Twenty Thousand Leagues Under the Sea,* nevertheless it can dive and travel under water, sinking if need be to a depth of 200 feet, where the pressure on each square inch of surface is 133 pounds, nine times as great as air pressure at sea level.

*External Appearance.* A submarine afloat looks not unlike a huge cigar of steel plates. It carries a conning tower set in the middle of a flat deck tapering to a point at either end and about twenty-five or thirty feet long. This conning tower, which serves as the captain's bridge when the craft is not submerged, is fitted with a lid about the size of the manholes seen in city streets; when the boat is ready to dive, the captain withdraws into the interior and the lid is screwed down so as to be watertight. In front of the conning tower is the periscope, which is the ship's eye when it is submerged. The periscope is a long, jointed pipe, fitted with reflecting mirrors, which can be extended twenty feet or so above the conning tower. Through this pipe the captain can command the part of the horizon in front of him when he is under water (see PERISCOPE). The ventilators of the submarine are so built that they may be telescoped and the openings through the deck sealed.

*Interior Arrangement.* The engines and motors are stored in the stern. Each of the two propellers is driven by a separate engine. The storage batteries that feed the motors are under the floor of the cabin. In the largest German submarines of 1917 they have sufficient capacity to run the vessel 200 miles or more under water. When the submarine returns to the surface, the motors are run as dynamos, and the batteries are recharged. The walls amidship and the bows are occupied with huge ballast tanks, into which water is drawn through valves when the vessel is to be submerged. From four to twenty torpedoes, the number depending on the size of the boat, weighing 1,500 to 2,000 pounds each and over sixteen feet long, are stored under the sleeping bunks along the side. The torpedo tubes, which are guns for hurling the torpedoes at the enemy at a rate of thirty-five miles an hour, are in the bows. Air for the crew is carried in steel cylinders under great pressure.

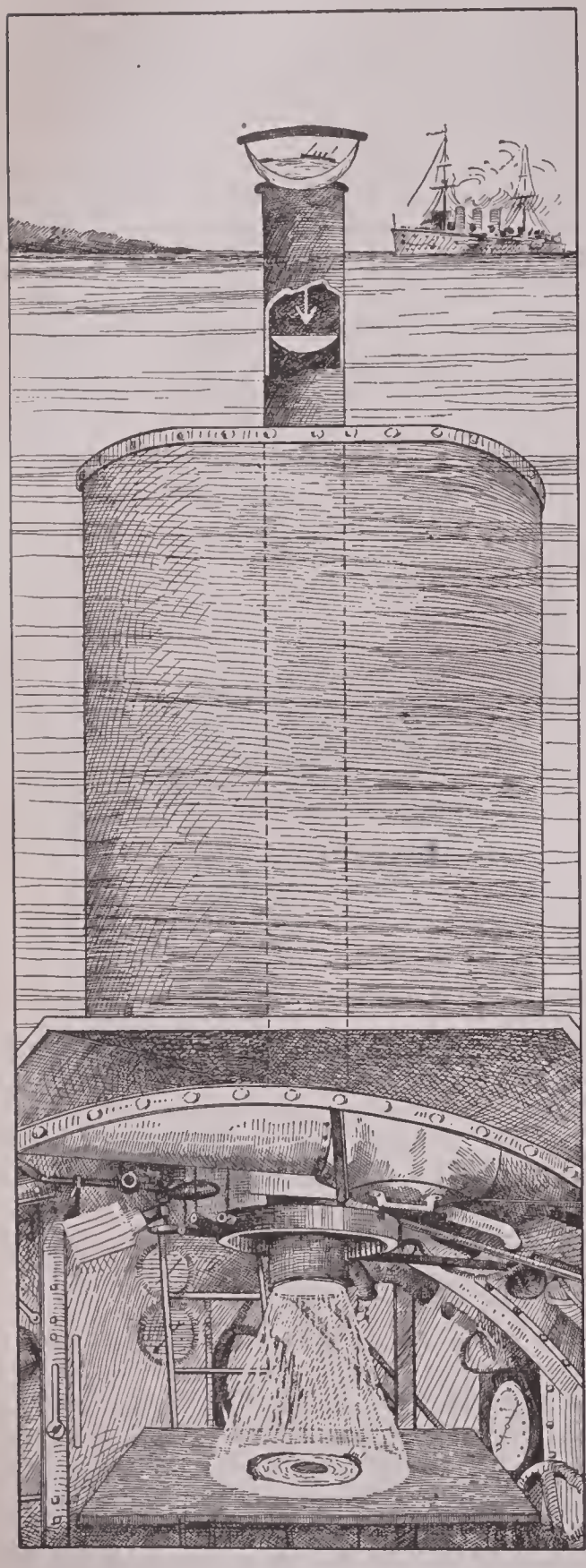



CROSS SECTION OF STANDARD SUBMARINE

1. Periscopes
2. Steering wheel
3. Engine telegraph
4. Air renewing appliance
5. Torpedo tube
6. Disappearing gun
7. Stairway
8. Torpedo
9. Diving tanks
10. Flooding valves
11. Ballast tanks
12. Men's cabin
13. Accumulators
14. Officers' cabin
15. Oil fuel
16. Wheels to diving rudder
17. Fresh-water tank
18. Oil engine
19. Electric motor
20. Ventilator
21. Torpedo hatch
22. Collapsible boat
23. Inner hull
24. Outer hull
25. Steering rudder
26. Propeller

**Submarine Service.** Submarines of the type described above may be only 100 or 135 feet in length, or they may be 250 feet long. In 1914 these vessels had a steaming radius of about 700 miles; in 1916 larger boats could travel 5,000 miles from their base. With so much machinery and such a weight of guncotton stored in a craft of small dimensions, it can readily be seen that there is not much room left for the crew. Space is, indeed, at a premium on board a submarine. Crowded into

narrow quarters, unmercifully tossed by waves, surrounded by driving steel cranks and rods and deafened by the pounding of the engines, the men must have strong nerves, under perfect control, to endure the strain to which they are subjected. The crew, therefore, are all picked men, drilled to the highest point of efficiency for the most perilous and nerve-racking service in the world. Notwithstanding this care in selection, few men in submarine warfare are able to remain long on duty.



THE PERISCOPE

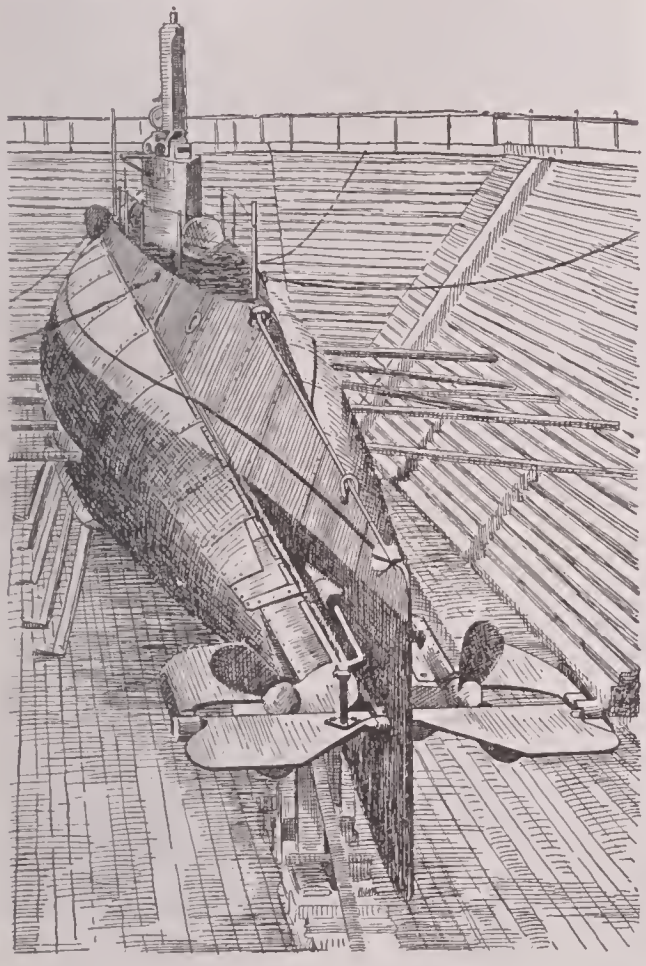
The lower part of the picture shows the roof of the submarine, with instruments attached to the roof. In the center is the periscope, rising above the superstructure. The image picked up by the periscope is reflected downward upon a table, and on this table is pictured the movement of events on the surface of the water.

**In Action.** When at anchor, the submarine shows two or two and one-half feet of dull gray hull above the water. When racing on the surface through a lively sea, the whole craft is awash. It maintains then a speed of about twelve or thirteen miles an hour. When the order is given to dive, the hatches are screwed down and the valves in the water tanks opened. Just enough water is admitted so that the ship would tend to float if it were not for the downward push given by horizontal rudders at the stern. Meantime the engine cranks have been detached from the oil engines and attached to the electric motors. These motors drive the vessel through the water at about nine miles an hour, "porpoising" at intervals but running for the most part with only the periscope and ventilators showing to the enemy. When within 800 yards or so of hostile craft, the vessel comes suddenly to the surface, lets drive its torpedo and then sinks at once from sight. Before the end of 1917 German submarines had been so perfected that they could rise to the surface, discharge a torpedo and submerge again in less than a minute.

**Cost.** Both in first cost and in expense of maintenance, the submarine is a relatively-cheap naval arm. The cost of the average submarine in 1914 was about $500,000; it was about 135 feet long. In 1917 the size and equipment of the German types had been increased, and the cost had risen to nearly $1,000,000. It can be maintained for about $22,000 to $35,000 a year, whereas a battleship costs over $10,000,000 and for maintenance about $800,000 annually. The life of a submarine, however, is comparatively short. In respect to enduring qualities it is an expensive craft.

**Protection of Ships.** The great loss of shipping resulting from the submarine warfare conducted by Germany was a direct challenge to the ingenuity of the opposing nations. After the entrance of America into the war, Thomas A. Edison and others worked out a system of protection for ships that included the following expedients: Hard coal was used in place of soft coal as fuel, to lessen the cloud of smoke that

makes a ship visible to a submarine for a distance of twenty-five miles. High masts and smokestacks were eliminated, and the sides of the vessel were disguised with a system of



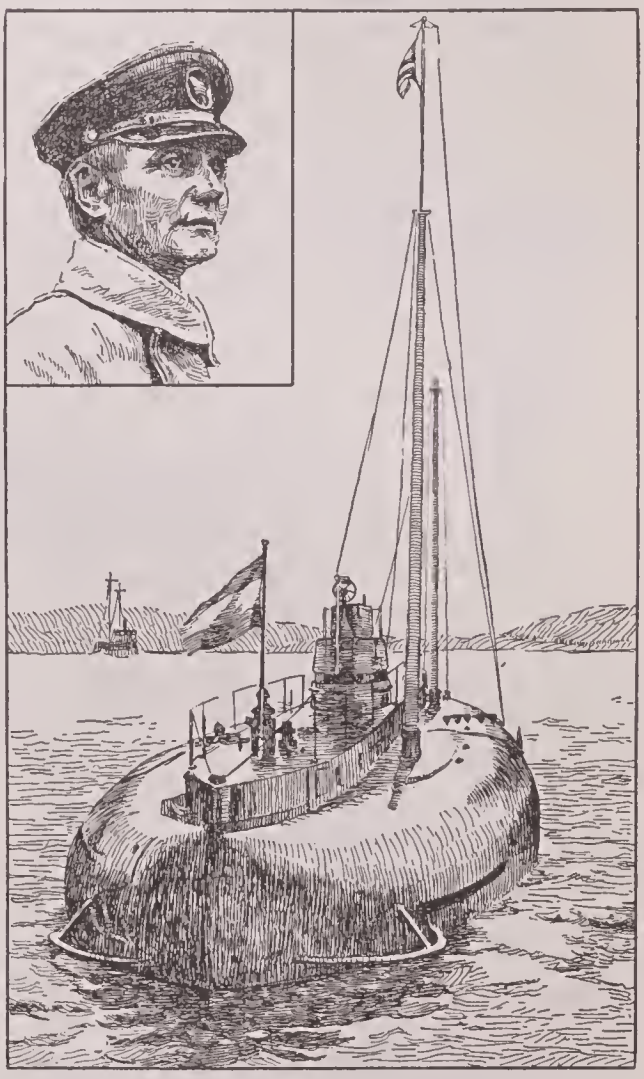
A BRITISH SUBMARINE

The *H-20,* shown above, is similar in construction to the American type. This illustration of a submarine in dry-dock presents a good view of the exterior design.

*camouflage*—that is, painted a gray that makes a ship invisible to a submarine until about a mile distant. Ships were equipped with smoke bombs, to be used in case the submarine came close enough to be dangerous. These bombs are dropped upon the water in the path of the pursuing submarine, and on contact with the water they begin to smolder, covering the sea with a dense, heavy cloud that effectually conceals the vessel. A system of increased flotation was also devised, greatly diminishing the liability of sinking. Submarine destroyers, small, swift boats manned by a few men, were put upon the seas in large numbers to carry on offensive warfare. What are known as depth bombs were invented to destroy submarines. These can be shot from guns and they explode with great violence at a designated depth in the water.

**History.** The submarine, like the aeroplane, has been long a dream of man. The first vessel of the type is said to have been constructed by a Dutch physicist, Cornelius van Drebbel, who exhibited it in the Thames and even invited King James to have a ride with him. The boat was built of wood and propelled by twelve rowers; little else is known about the original submarine.

The first submarine to be used in war was built by a colonial, David Bushnell, during the American Revolutionary War. Bushnell's craft, like Van Drebbel's, was propelled by oars. He called it the *Turtle.* This boat was submerged and brought under the hull of a British ship in New York harbor, but the operator found it



THE DEUTSCHLAND AND ITS MASTER

Captain Paul Koenig, "admiral of the underseas," and the vessel in which he made two trips to America in 1916.

impossible to drill through the ship's bottom and had to abandon his craft.

Robert Fulton, inventor of the steamboat, constructed the first cigar-shaped submarine while he was living in France, and gave successful exhibitions in the harbor of Brest, afterwards taking his invention to England. This submarine was known as the *Nautilus*—a name

borrowed by Jules Verne for Captain Nemo's ship. The *Nautilus* stayed under water for five hours and blew up an old hulk with a mine; nevertheless, its inventor received no encouragement and turned his attention to the steamboat.

During the War of Secession the Confederates built a submarine known as the *David,* with which they succeeded in wrecking the *Housatonic,* a Federal ship anchored in Charleston harbor. The *David* sent six crews to the bottom of the sea. It was about sixty feet long and was manned by nine men, eight of whom propelled it by working a screw shaft by hand while the ninth steered.

In developing the practicable submarine of the present, the American and French nations took the lead. Two early French submarines which proved capable of service were the *Gymnote* and the *Goubet*. They were tested at Toulon and Cherbourg in 1889, and were maneuvered with considerable ease. The *Goubet* had a displacement of two tons. It was equipped with an electric motor and a storage battery; air was furnished from reservoirs, as in the latest type. The type of craft which has been developed by the chief nations was the invention of John P. Holland in 1877. It is the Holland vessel that is described in this article.

The submarine was a most important and the most dreaded factor among the entente allies in the War of the Nations. In the winter of 1916-1917 the Germans proclaimed it their chief reliance in the effort to secure victory. The story of this submarine struggle is told in the article WAR OF THE NATIONS. G.B.D.

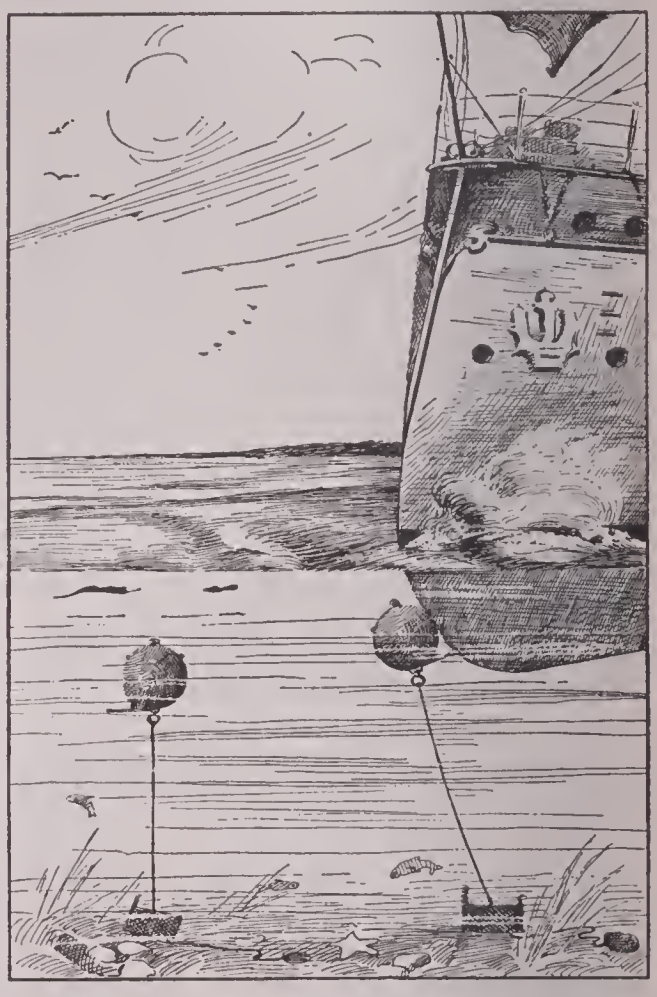
No book written prior to 1914 is of value as a description of the submarine of to-day. However, the following are recommended for outlines of the principles of construction and for the history of the craft: Field's *Story of the Submarine;* Bishop's *The Story of the Submarine.*

**SUBMARINE CABLE.** See CABLE, SUBMARINE.

**SUBMARINE MINE,** an unseen weapon of destruction against which the mightiest battleship is helpless, a hidden menace more dreaded by naval men than any gunfire or attack by overwhelming visible forces. Great ingenuity has been used in the preparation of mines which may in an instant turn the most peaceful harbor or the smoothest seas into a scene of death and disaster. It was not until the War of Secession that submarine mines were regarded as dangerous, or even practicable; but during that great struggle they acquired such a record for destructiveness that it became apparent they must play an important part in wars of the future.

Modern submarine mines are of three kinds—observation, electro-contact and automatic. Not only are these mines, when laid, of terrible destructive power, but the placing of them in the sea or inland waters is attended by considerable danger.

**Observation Mines.** As the name implies, these mines are placed in waters that may be



SUBMARINE MINES

They may rest fastened to the sea bottom or may be arranged to float at any distance from the surface.

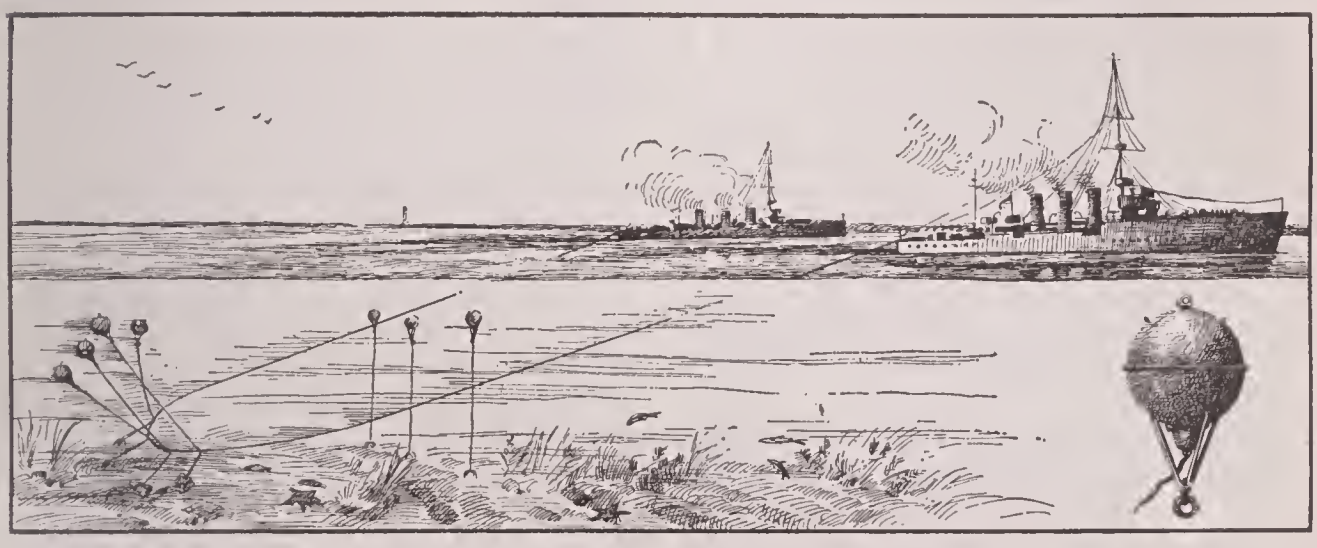
overlooked from the shore. They may be arranged singly, in groups, or in line across the openings into harbors. This type of mine has a casing of steel, is buoyant, and is loaded with from 200 to 500 pounds of wet guncotton. It is destructive within a radius of thirty feet when exploded below the surface. Observation mines are exploded from the shore merely by switching on an electric current. A group of three, five or seven mines, or one mine only, may be thus exploded at a time; the defended water is plotted out, showing the observer exactly the position of ships entering and what mines must be exploded to destroy them.

**Electro-Contact Mines.** These mines are made either of iron or steel, and contain a charge of seventy-five pounds of guncotton, which is sufficient to destroy the biggest ship afloat. They lie nearer the surface than observation mines, as they are intended to explode when actually in contact with the bottom of a vessel. Running through the explosive charge is an electric wire called the firing circuit. To complete the circuit the mine must be tipped over to an angle of seventy degrees. At this angle mercury, placed in the pedestal carrying the electric wire, also tilts and bathes both ends of the wire, completing the circuit and causing the explosion. The electric current is supplied from a shore battery, and all that is needed to make these mines harmless is to turn off the current.

**Automatic Mines.** These are the most dangerous to handle, as they contain within themselves all that is necessary for explosion, and do not depend on an electric spark flashed from the shore. The firing battery is in the shell itself. In appearance and construction these mines are similar to the other two varieties, and are either spherical or cylindrical in shape. They are absolutely beyond control when once laid, and a fishing boat is as liable to destruction as a warship. Friend and foe are equally in danger, unless the exact location is known; when anchored by weights they are carefully charted for the benefit of friendly and neutral shipping. Automatic mines, when scattered indiscriminately over the sea, are called *floating mines*. Drifting according to wind, tide and currents, they are a menace to all shipping.

**Mine Laying.** The proper placing and laying of mines is a complicated operation. Mines cannot be dropped haphazard into the sea. The position must be carefully studied and the depth beneath the surface accurately calculated, as also must be the localities where the effect will be greatest. In mines to be exploded by electric current from the shore the laying of cables is a work requiring care, and the wires connecting the mines to the cable and the shore battery must be sufficiently strong to anchor the mine, and of a sufficient length to keep the explosive at such a depth that it will be out of the path of vessels allowed to enter or leave harbor.

**Searching for Mines.** The accompany illustration clearly shows the principal method of searching the sea for suspected mines. The work involves great difficulty and danger, as the mines can be located only after the vessels have successfully passed over the zone of danger. The two vessels are connected by a heavily-weighted cable, which they drag between them. Mines thus caught are destroyed. If an electrical cable is caught in the net it is at once cut, rendering all mines connected with that cable ineffective. Areas of mined waters may be rendered safe also by countermining, that is, by exploding mines in the suspected area. The explosions would cause all previously laid automatic mines to explode and might force adrift mines attached to electric cables and render them harmless.



SEARCHING FOR MINES IN A MINE FIELD

**In the War of the Nations.** Numerous warships, destroyers, passenger steamers and other vessels were destroyed by mines during the great war. These instruments of destruction were laid principally in the North Sea, the English Channel and the Mediterranean Sea, but other waters traversed by ocean craft were not entirely free. Both the British and the German naval departments put forth special

efforts to combat this menace to their shipping. In the summer of 1917 the Germans were especially active in mining operations in the North Sea, and their mine layers had numerous fights with British fighting craft. The Germans also built a special type of submarine for mine planting. One such submarine, captured by the British, carried sixteen mines, placed two by two in inclined tubes, the lower end of each tube being open to the sea. Because the submarine can work under water, it is admirably adapted to operations that must be carried on without the enemy's knowledge. F.ST.A.

Consult Sueter's *Evolution of the Submarine Boat, Mine and Torpedo;* Sleeman's *Torpedoes and Torpedo Warfare.*

**SUBPOENA,** *sub pe'na.* If an officer of a court of law serves upon you a written notice to appear at a certain hour and give testimony in a case in court, you must obey the command or be liable for contempt of court (see CONTEMPT). The name applied to such a notice is *subpoena,* which is Latin for *under penalty.* If it is a *subpoena duces tecum* (bring with you under penalty) it contains a clause demanding that you bring to court certain papers, books or other exhibits.

**SUBSIDY,** *sub'si di.* When the Union Pacific Railroad was built the United States granted the railway corporation tracts of public land located along the line as a partial reimbursement for the vast sum of money expended in building the railroad. Since then other great railroads have received such important assistance. Aid of this nature extended by a national, state or city government to some private enterprise, for the purpose of helping it become established on a firm financial basis, is a *subsidy,* and the corporation or firm receiving the aid is said to be *subsidized.* Premiums or bounties on exports and bounties paid for killing animals are a form of subsidy.

The wrong use of this sort of aid has led many to think that any subsidy is a bribe; on the contrary, in such instances as that of the Union Pacific Railroad, it is a necessity and is granted because the government believes that the benefit derived from the enterprise will be greater than its cost to the state. Merchant marines are often built up by the granting of ship subsidies. Before the War of the Nations Germany gave $800,000 a year to the Hamburg-American Line for the partial maintenance at sea of the great *Vaterland,* the *Imperator* and other passenger vessels which could not be made self-sustaining. This general policy built up a great merchant fleet for the German Empire. Formerly in England a subsidy was a tax levied upon individuals for special aid to the king in times of stress. In English history it has meant the financial aid rendered by the nation to another at war. See BOUNTY.

**SUBTRACTION,** *sub trak'shun,* the process of finding the difference between two numbers, or of taking one number out of another. The number subtracted is called the *subtrahend.* The number out of which the subtrahend is taken is called the *minuend.* The result is called the *remainder,* or *difference.*

**Teaching of Subtraction.** Addition and subtraction go hand in hand, but the latter is more difficult of mastery because it is "association backward," while addition is "association forward." The mind readily turns the new problem of subtraction into the more familiar one of addition. One well-known author on the subject speaks of this translation of subtraction into addition as "having the advantage of using only one table for addition and subtraction and of saving much time in operation." Another refers to it as "primitive, barbarous, awkward and time destroying."

1. Sarah has 9 pennies and Tom has 5 pennies. How many more has Sarah than Tom?

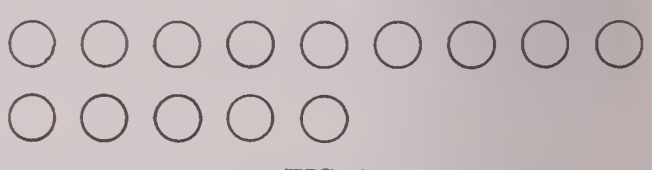


FIG. 1

Sarah has 4 more.

How many pennies must Tom get to have as many as Sarah? He must get 4.

In both the above cases we see that the difference between 5 and 9 is 4, and that 4 must be added to 5 to get 9. In addition we say it in this way: $5+n=9$. When we have the answer, we say $5+4=9$. In subtraction we say $9-5=n$, and having the answer, we say $9-5=4$.

| Addition | Subtraction |
|---|---|
| $8+n=12$ | $12-8=n$ |
| $8+4=12$ | $12-8=4$ |
| $9+n=16$ | $16-9=n$ |
| $9+7=16$ | $16-9=7$ |

In addition we say, "What number added to 8 gives 12?" In subtraction we say, "8 taken out of or 'away from' 12 leaves what?" Those who would always look at the problem from the viewpoint of addition follow the well-known "Austrian Method" of subtraction.

2. Sarah had 9 pennies, and gave 5 to Tom. How many pennies has she left?

Here we clearly have the problem, $9-5=n$, or, "When 5 is taken out of 9, how many are left?" This is not the problem of the difference between 9 and 5, like problem 1, and it is seen thus:

FIG. 2

**Concrete Work.** As in addition (see ADDITION), much *concrete* work should be done in building up groups and taking them apart to make subtraction clear; for example, a group of 12 pennies may be separated in various ways: $12=5+7$, $12-5=7$, $12-7=5$. This *formal* way of writing it must be introduced slowly and carefully, with much *oral* work preceding it and accompanying it. Below are suggestions for concrete material:

1. Groups of pennies, nickels, dimes.
2. Groups of inch cubes, of cardboard squares.
3. Compare various objects as to length, width and height by measuring with foot rule or yard rule.
4. Compare heights of children.
5. How much farther can John jump than Dan? Measure in inches and subtract.
6. Compare weights of articles.
7. Compare costs of various articles, using money.
8. Have foot rule, yard rule, scales, money, pennies, nickels, dimes, dollars (real money), cubic blocks, etc.

**Home Help.** At home mother or father may do much to help at this point, for the freedom of movement and variety of material, and opportunity for measuring and grouping and thus getting material for comparison by subtraction, are much greater at home than in the ordinary schoolroom. (For further suggestion as to home help, see ADDITION.)

**Suggestions for Rapid Work.** 1. Cards like the illustration may be held up before the class by the teacher for an instant, and the children may write each answer. When a number of cards have been shown in this way, the answers may be given, and each child may know where he has made an error. In checking in this way, the teacher finds which combinations give greatest difficulty. The class may take sides in this, seeing which side has the greater number correct. This may be done orally as a rival game or just as a quick review.

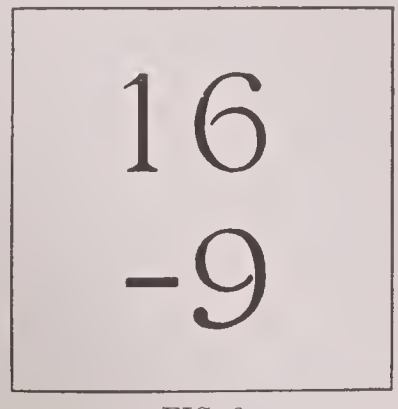



FIG. 3

2.

| | | | |
|---|---|---|---|
| 11 | 21 | 31 | 41 |
| −3 | −3 | −3 | −3 |
| 12. | 22 | 32 | 42 |
| −7 | −7 | −7 | −7 |

A set of cards like the above may be passed to the class and exchanged among the children; the answers may be given orally, or written on the blackboard or on paper, but not on the card. Thus the same cards may serve many classes.

3.

| | | | | |
|---|---|---|---|---|
| 12 | | 29 | | |
| 8 | | 18 | | |
| 9 | | 15 | | |
| 11 | | 17 | | |
| 13 | −5 | 9 | −9 | |
| 15 | −6 | 11 | −8 | |
| 6 | | 21 | −7 | |
| 7 | | 12 | | |
| 14 | | 22 | | |
| 24 | | 27 | | |

Placing lists of this kind upon the blackboard gives opportunity for comprehensive review, and for repeated review of any difficult subtraction. The lists may be long or short and the subtrahend may be changed many times.

4.

| | | | | | | |
|---|---|---|---|---|---|---|
| $n$ | $n$ | $n$ | $n$ | $n$ | $n$ | $n$ |
| −8 | −9 | −7 | −5 | −6 | −4 | −6 |
| 15 | 9 | 3 | 9 | 7 | 9 | 0 |

The problems are on the blackboard; the child goes quickly to the board, erases $n$ and puts the minuend number in its place.

5.

| | | | | | |
|---|---|---|---|---|---|
| 12 | 16 | 13 | 23 | 12 | 12 |
| −$n$ | −$n$ | −$n$ | −$n$ | −$n$ | −$n$ |
| 7 | 7 | 4 | 14 | 9 | 5 |

The child goes to the board, erases $n$ and puts the subtrahend number in its place.

6. Under ADDITION many suggestions will be found that may be changed so as to serve the purpose of the teacher in subtraction (see ADDITION).

**Subtraction of Numbers of Two or More Digits.** (a) Use dimes and pennies and the first step is very simple. The child has 2 dimes and 7 pennies. He spends 9 pennies. What has he left?

| dimes | pennies | | dimes | pennies |
|---|---|---|---|---|
| 2 | 7 | = | 1 | 17 |
| | −9 | | | −9 |
| | | | | 8 |

Have a stack of pennies so that he may change his dime for pennies.

(b)
$$\begin{array}{r} 27 \\ -9 \\ \hline \end{array} = \begin{array}{r} 10+17 \\ -9 \\ \hline 10+\ 8=18 \end{array}$$

(c)
$$\begin{array}{r} 14 \\ +8 \\ \hline 12 \\ 10 \\ \hline 22 \end{array} = \begin{array}{r} 22 \\ -8 \\ \hline 14 \end{array} = \begin{array}{r} 10+12 \\ -8 \\ \hline 10+\ 4 \end{array}$$

$$\begin{array}{r} 48 \\ +5 \\ \hline 13 \\ 40 \\ \hline 53 \end{array} = \begin{array}{r} 53 \\ -5 \\ \hline 48 \end{array} = \begin{array}{r} 40+13 \\ -\ 5 \\ \hline 40+\ 8 \end{array}$$

In the above addition we understand how 12 is made by 4 and 8, and how 13 is made by 5 and 8, and see that when we come to subtract we must think of 22 as 10+12, and 53 as 40+13 (see ADDITION).

$$\begin{array}{r} 65=50+15 \\ -49=40+\ 9 \\ \hline 16=10+\ 6 \end{array}$$

$$\begin{array}{r} 91=80+11 \\ -48=40+\ 8 \\ \hline 43=40+\ 3 \end{array}$$

Explanation: The subtraction is done beginning at the right: 9 from 15, 6; 40 from 50, 10. Then the sum of 10 and 6 is written to the left.

(d)
$$\begin{array}{r} 193=100+80+13 \\ -147=100+40+\ 7 \\ \hline 46=\qquad\quad 40+\ 6 \end{array}$$

$$\begin{array}{r} 243=200+30+13=100+130+13 \\ -198=100+90+\ 8=100+\ 90+\ 8 \\ \hline 45=\qquad\qquad\qquad\qquad\quad 40+\ 5 \end{array}$$

(e) In time the writing out in full may be dropped and the separation done mentally, as follows:

$$\begin{array}{r} 243 \\ -198 \\ \hline 45 \end{array}$$

Explanation: Take 10 from 40 or 1 ten from 4 tens and add it to 3, which gives 13. 8 from 13 leaves 5. Take 100 from 200 and add it to 30, making 130, or take 100, which is 10 tens, and add it to 3 tens, making 13 tens. 9 tens from 13 tens leaves 4 tens or 40. The result is 45. This can be seen very clearly with dollars, dimes and pennies.

**Other Methods.** There are other methods of subtraction in common use, but the above is explained most easily to the young mind. The Austrian Method sees subtraction as addition:

$$\begin{array}{r} 657 \\ -398 \\ \hline 259 \end{array}$$

Explanation: 8 and 9, 17; 10 and 5, 15; 4 and 2, 6. The minuend is held in mind as the sum of two numbers and the subtrahend as one of these numbers. As the other number is found in each column, it is placed in the answer.

Another method:

$$\begin{array}{r} 657 \\ -398 \\ \hline 259 \end{array}$$

Explanation: 8 from 17, 9; 10 from 15, 5; 4 from 6, 2. 10 is added to the minuend to make 7, 17. To equalize matters 1 ten is added to 9 tens in the subtrahend. 10 tens is added to 5 tens in the minuend, and again to equalize matters, 100 (which is equal to 10 tons) is added to the subtrahend. It is seen clearly in the following form:

$$\begin{array}{r} 657=600+50+7 \\ -398=300+90+8 \end{array}$$

It becomes for easy subtraction:

$$\begin{array}{r} 600+150+17 \\ 400+100+\ 8 \\ \hline 200+\ 50+\ 9=259 \end{array}$$

110 has been added to both minuend and subtrahend. This method is in common use among adult people, and is less strain upon the mind than the first method presented. But it should not take the place of that method with young children because of the difficulty to the child mind of understanding it. It is easily adopted later.

**Place Value.** Read in connection with subtraction the articles ADDITION and NOTATION, where *place value* is discussed. A.H.

**SUBWAY,** or **UNDERGROUND RAILWAY,** a tunnel or system of tunnels for the purpose of placing a railroad beneath the level of the street. Such systems are coming more and more into use, and in some cities, especially New York and London, they form a vast network of underground railways. London was the first city to adopt subways, and now has five systems affording quick and economic transportation to all parts of the city and suburbs. A subway destined to grow to large proportions was opened in Buenos Aires in 1913.

In the United States subways have been constructed only in New York, Boston, Philadelphia and Chicago, but have for some time been under consideration for other cities. The New York subways form the largest underground railway system in the world. Chicago's subways as yet are for freight only, and are nearly seventy miles long, under the central business district. The city still relies on its street railways and elevated railways to provide passenger service, but passenger subways on a large scale are planned.

The first subway built in London was operated by steam locomotives. All subsequent subways have been operated by electricity.

The cost of construction is very high, the New York system requiring an outlay of an average of $2,000,000 per mile, sometimes reaching as high as $5,000,000 per mile, exclusive of equipment. The two-track subways in Paris cost $850,000 per mile, while the London "tubes" cost about $1,500,000 per mile, exclusive of equipment.

The fare in American subways is the same as that on most surface cars, which is five cents. In London, the fare varies with the distance, the minimum being two pence (four cents). In Berlin the charge is from ten pfennige, or two cents, to thirty-five pfennige, or seven cents, depending on the class of ticket and the distance.

*New York City Subways.* Rapid transit in the United States reaches its highest development in its most congested district, New York City. The total number of passengers carried on all New York subways is about 1,000,000,000 a year, an average of 3,000,000 a day. For details of the New York subways, see NEW YORK, subhead *Transportation.* W.F.Z.

**SUCCESSION,** *suk sesh'un,* **WARS,** those wars that were caused by rival claims to the inheritance of a throne. Four important wars in modern European history are known by this name, the War of the Spanish Succession, the War of the Polish Succession, the War of the Austrian Succession and the War of the Bavarian Succession.

**The War of the Spanish Succession.** This struggle began in 1701 and lasted until 1714. It is also known in American history as Queen Anne's War.

Charles II, king of Spain, was childless, and the question as to who would be his successor was of vital importance to Europe. Family alliances among related sovereigns were very common in those days, and if a foreign-born prince ascended the throne of Spain as nearest heir, which seemed inevitable, an entirely new alignment of the European powers was apt to be the result. The laws governing the succession were so involved and the claims of the different heirs were so conflicting that it is almost impossible, even at the present day, to know who rightfully should have worn the Spanish crown. Suffice it to say, the valid claims soon were narrowed down to three heirs, the French prince Philip, duke of Anjou and grandson of Louis XIV, Joseph Ferdinand, the young electoral prince of Bavaria, and the Archduke Charles of Austria, son of Emperor Leopold I.

The leading powers of Europe joined in a treaty in 1698, according to which Joseph Ferdinand was to become king of Spain, and France and Austria were to be compensated with territories from the extensive Spanish possessions in Italy and other parts of Europe. Unfortunately, the electoral prince died, and the matter was unsettled again. A second treaty, in 1699, arranged that the Archduke Charles was to receive the Spanish crown, and the French royal family would be indemnified by additional Spanish territory. Everything seemed to be arranged in order to guarantee the peace of Europe when King Charles II died in Spain on November 1, 1700, leaving a will by which he bequeathed the crown to the French prince, Philip of Anjou. Louis XIV then broke his solemn word given when he signed the treaty, proclaimed his grandson to be king of Spain and declared that "the Pyrenees were no more." All Europe stood aghast at the prospect of the virtual annexation of the Spanish empire to the preponderant power of France, and Louis further angered the English by recognizing the son of the dethroned James II as the rightful king of England.

Almost immediately the Grand Alliance was formed between England, the Holy Roman Empire, the Netherlands, Prussia and Hesse in order to prevent Philip of Anjou from becoming king of Spain and to aid the Archduke Charles to ascend that throne in his place. The allied forces were placed under the command of two great generals, the English Duke of Marlborough and Prince Eugene of Savoy, under whose leadership the French were defeated decisively during the years 1704 to 1709 in the well-known battles of Blenheim, Ramillies, Oudenarde and Malplaquet. The fighting was for the most part in Germany and the Netherlands, although there were several campaigns in Spain which finally degenerated into guerilla warfare. These ended with the establishment of Philip as king and the extension of his rule over most of Spain.

The allies possibly might have overthrown Louis XIV and seized Paris had not dissensions broken out among them, and in addition party politics in England caused the Tory government of that country to desire peace in order to discredit the victorious Marlborough, who was a prominent Whig. Louis XIV, although badly defeated and his country exhausted, took heart and by skilful diplomacy brought about the Peace of Utrecht in 1713, by which he obtained fairly favorable terms,

including the recognition of his grandson as king of Spain. France and Spain never were united, however. The emperor refused to sign the Treaty of Utrecht and did not make peace until a year later, when he found it necessary to give way and sign the Treaty of Rastadt upon almost the identical terms of the Peace of Utrecht.

Consult Parnell's *War of Succcssion in Spain;* Stanhope's *History of the War of the Succession in Spain.*

**The War of the Polish Succession,** fought during the years 1733 to 1735, was caused by the election by Polish nobles of Stanislaus Leszczynska, father-in-law of Louis XV of France, as king of Poland. Russia and Saxony forced the Poles to accept the Elector Augustus of Saxony as king, and war followed. France failed to keep Stanislaus on the Polish throne, but he was given the duchy of Lorraine, which reverted to the French crown at his death in 1766. Although France ultimately gained this territorial accession, its prestige received a damaging blow.

**The War of the Austrian Succession** was also known in America as King George's War. The struggle began in 1740 and lasted until 1748. It was caused by the death in the former year of Emperor Charles VI, who left as heiress to his dominions a daughter, the famous Maria Theresa. The great powers of Europe had guaranteed her succession to the Austrian dominions by the Pragmatic Sanction, but they broke their pledged word and attempted to despoil the young princess of her inheritance.

The first to attack Maria Theresa was Frederick the Great, king of Prussia, who promptly and without scruple invaded and conquered the province of Silesia. During the next year, 1741, he strengthened his hold upon the territory by an overwhelming victory at Mollwitz. France and Spain and the two strong German states of Bavaria and Saxony joined Prussia, and for a time Maria Theresa was threatened with the loss of her dominions. The Elector Charles of Bavaria was chosen emperor by means of the support of the allies, and the Hapsburg family for the first time in 300 years failed to hold the throne of the Holy Roman Empire.

However, Maria Theresa saved her crown and most of her dominions by her own indomitable courage and vigorous leadership. She appealed to the Hungarians to defend her, their queen, and also roused the other people of her varied dominions to her support. Furthermore, she was aided by an alliance with the great maritime powers, England and Holland, who crushed the power of France at sea. Maria Theresa soon drove out the new emperor, Charles VII, even from his Bavarian dominions, and he died in 1745. She then received the title of empress through the election of her husband, Francis of Lorraine, as Emperor Francis I.

Maria Theresa, after making two separate treaties of peace with Frederick the Great, finally separated this most dangerous antagonist from the alliance with her other enemies, but accomplished it only at the price of the cession to him of Silesia. Also with the aid of the armies of her English and Dutch allies she carried on the war against France and Spain with great vigor and success. However, her victorious career was checked by the brilliant victories of the French army in the Austrian Netherlands under the command of the German-born Marshal Saxe, and as her dominions, with the exception of Silesia, were safe under her control, she was induced by the more peaceful attitude of her allies, England and Holland, to agree to make peace.

The Treaty of Aix-la-Chapelle, which was signed in 1748, finally ended the war. Maria Theresa, however, refused to consider that she had lost Silesia beyond recovery. The empress at once began the negotiations that led to the realignment of the European powers and to her final attempt to destroy Frederick the Great and regain Silesia, through a later conflict that was to be known as the Seven Years' War.

Consult Shrine's *Fontenoy and the War of the Austrian Succession.*

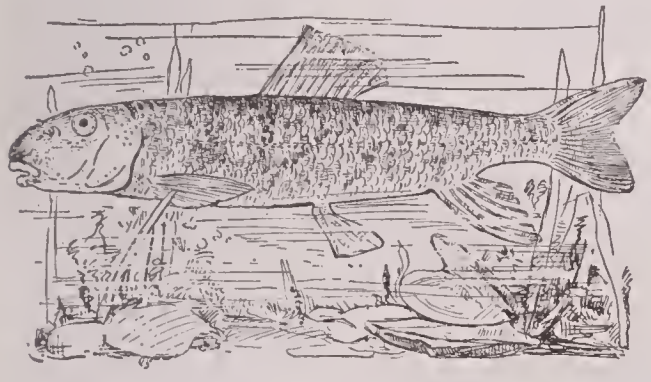
**The War of the Bavarian Succession** was a short quarrel during the years 1778 and 1779 between Prussia and Austria over the succession to the throne of Bavaria and the disposition of part of the Bavarian territory. The Elector Maximilian Joseph died in 1777, leaving no direct heirs. Austria then attempted to dominate the affairs of Bavaria and to dictate the succession, thus arousing the jealousy of the ever-watchful king of Prussia, Frederick the Great. Both Prussia and Austria invaded Bavaria with their armies, and a bloody war seemed inevitable, but no serious battle was fought and the dispute finally was compromised. Neither country was anxious for war, and France and Russia used their good offices to mediate between them and secure peace. The Treaty of Teschen was signed in 1779, and both Austria and Prussia were satisfied by certain territorial gains. This war was not of

very great historical importance except for the fact that by accepting the mediation of Russia the powers recognized that country as a member of the family of European nations, and its influence increased from that time. E.D.F.

**Related Subjects.** For other details as to the Succession Wars, the reader is referred to the following articles in these volumes:

Aix-la-Chapelle, subhead *Treaties of Aix-la-Chapelle*
Blenheim
Charles VI (Holy Roman Emperor)
Eugène, François
French and Indian Wars, subheads *Queen Anne's War* and *King George's War*
Frederick II (of Prussia)
Louis XIV (of France)
Maria Theresa
Marlborough, Duke of
Pragmatic Sanction
Spain, subtitle *Government and History*
Utrecht, Peace of

**SUCK'ER,** the name given to several kinds of fish belonging to the catfish family, which have mouths with thick, fleshy lips. There are several species, all of moderate size, and all, except one Siberian group, natives of North



THE SUCKER

America. They are dull-colored except in spring, when the males have rose or orange markings. Suckers are found in rivers, lakes, bayous and mill ponds, where they obtain their food by sucking up mud and soft organisms from the bottom. They are little used for food, because the flesh is soft and tasteless.

**SUCK'LING,** Sir John (1609-1642), an English lyrical poet of the metaphysical group, born at Whitton, Middlesex, and educated at Cambridge. He fought under Gustavus Adolphus, amused and startled London with his wit, bravado and spendthrift habits, and spent immense sums of money for the king in the conflict with Cromwell. Accused of taking part in the plot to release Strafford from the Tower, he fled to the continent, was arrested, tried before the Spanish Inquisition and released, then returned to Paris and there poisoned himself. His *Why So Pale and Wan, Fond Lover; A Ballad upon a Wedding* and *I Prithee Send Me Back My Heart* are famous.

**SUCRE,** *soo'kra,* the official capital of Bolivia, known as Chuquisaca until 1826, when it was named Sucre in honor of the first President of the republic. Though Sucre is officially the seat of government, La Paz (which see) is the actual legislative and executive capital. The former is, however, the seat of the Supreme Court of Bolivia. Sucre lies in the midst of picturesque mountain scenery on a plateau 9,328 feet above sea level, and is situated on a small tributary of the Pilcomayo, 318 miles southeast of La Paz. It was famous in colonial days for its wealth, which was derived from the silver mines in the vicinity, and monuments to its former grandeur are seen in its buildings and institutions. Its Saint Xavier University, with schools of law, medicine and theology, is reputed to be the oldest in South America. The city has mining and agricultural interests. It was founded in 1536 and was originally called La Plata. Population, estimated in 1915, 29,686.

**SUDAN,** or **SOUDAN,** *soo dahn',* a vast region of Central Africa, about twice the size of Canada's Northwest Territories, extending from the Sahara Desert on the north to Congo Free State on the south, and from French Senegambia on the west to Egypt. The region is inhabited by negro and Arab tribes, but is controlled by European powers; the extreme western section is under French influence, and the eastern section, or Anglo-Egyptian Sudan, is governed by the British. In this latter the natives are given the less important government positions, but the governor and his assistants are British officers; however, Darfur, a district within the limits of the English Sudan, is still ruled by its hereditary sultan.

The northern plains of the Sudan, which are continuations of the Sahara Desert, are practically barren, but in the western and southern districts, watered by the Niger and Congo rivers, vegetation is luxuriant. Bananas and other tropical fruits, sugar, rice and cotton are raised and exported. Great forests yielding gums, rubber and ebony border the streams, on which navigation in the light native boats is usually dangerous because of the numerous crocodiles and hippopotami. Around Lake Chad there are dense, swampy jungles inhabited by herds of wild elephants. These regions furnish most of the world's supply of ivory and gum arabic.

In the eastern section, where there is less vegetation, the natives raise large herds of cattle, camels, sheep and ostriches. Cattle raising

is increasing as a result of the investigation and work of the government in the elimination of the cattle disease. Gold is the only mineral which at present is being mined successfully, though iron and silver are also found in abundance.

The English have introduced modern improvements in communication and transportation; in 1914 there were 1,550 miles of railroad; 2,100 miles of local telegraph, besides telegraphic communication with Cairo and two cities of Eritrea. Mail and messages are delivered by native carriers from seventy-five post offices. There are many schools throughout the Sudan where natives are taught reading, writing and arithmetic in their own language, and six primary schools in the chief cities, having an attendance of about 1,000 pupils. Boys are given further training in the government offices, industrial workshops and at Gordon College in Khartum. The education of women has been begun, and there are now three girls' schools in which over 175 pupils are enroled. The work of the scientific research laboratory for the furtherance of agricultural experiment and education is doing much to develop the agricultural possibilities of the region. As in Egypt, English control is proving to be a great factor in the development of the country and the enlightenment of its inhabitants. The number of people is not known. E.B.P.

**Related Subjects.** The following articles in these volumes will be of interest in this connection:

| | |
|---|---|
| Congo River | Khartum |
| Gordon, Charles George | Niger |
| Ivory | Sahara |

**SUDAN GRASS,** a hay plant belonging to the sorghum family, introduced into the United States in 1909 from Khartum, Sudan, by the Federal Department of Agriculture. First tested in Texas, it gave such excellent results that since then thousands of acres have been planted in the South and Southwest, both in humid and in irrigated sections. Sudan grass has a fibrous root system and is grown from seed which must be planted every year, as it is an annual. As it has no perpetual rootstock, there is no danger of its becoming a weed and a pest. The grass is cultivated both as a forage plant and for its seed. Sudan hay has a higher feeding value than timothy, and is liked by stock, especially hogs. It is one of the best drought-resisting plants known to American farmers, and can be grown on almost any kind of soil. Two cuttings of hay a year can be obtained in semiarid regions, and three in humid sections. The first crop matures in from sixty to eighty days.

**SUDBURY,** *sud'ber i,* a town in Ontario, the capital of the Sudbury district. It is in Northern Ontario, about 180 miles north of Georgian Bay, and by rail is seventy-nine miles west of North Bay and 262 miles north of Toronto. It is on the main line of the Canadian Pacific and the Algoma Eastern railways, and is on a branch, running to Sudbury Junction, of the Canadian Northern. Population in 1911, 4,150; in 1916, 6,500.

Sudbury is the heart of the greatest nickel-mining district in the world. All the activities of the town are subordinate to this one industry. It is estimated that over sixty per cent (20,000 tons) of the world's annual output of nickel comes from the Sudbury district. The town has a number of fine buildings, including the $150,000 post office, erected in 1915; and the Nickel Range Hotel, built in the same year for the same cost. A large flour mill was built in 1910 at a cost of $750,000. Sudbury was settled in 1884 and was named for Sudbury, England. In 1896 it acquired ownership of the electric light and water plants.

**SUDERMANN,** *zoo'der mahn,* HERMANN (1857- ), a dramatist and novelist, born at Matzsicken, Prussia. He was educated in the public schools of Elbing and Tilsit, Prussia, and in the University of Königsberg, Germany, where he made a close study of history, literature and philosophy. For a short time he was a private teacher in Berlin, but in 1881 he became editor of a newspaper in that city and three years later began to devote his entire time to writing plays and fiction.

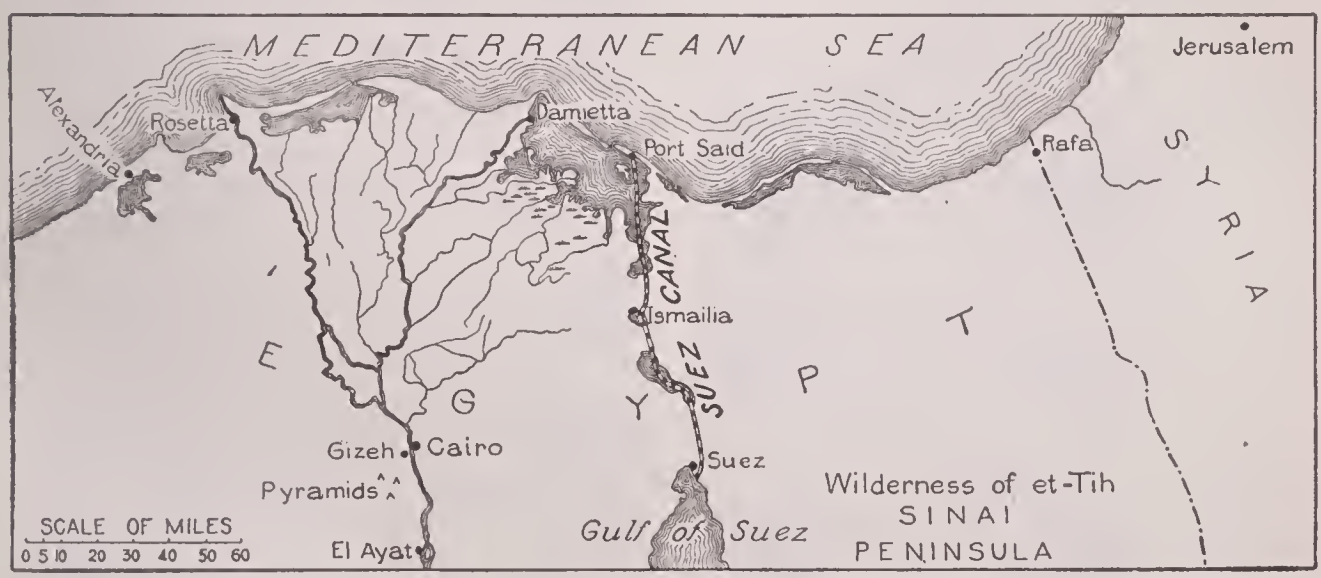
His earlier novels, *Dame Care* and *Regina,* attracted very little attention, but in 1889 he sprang into national fame with his drama of German life, *Ehre.* It pleased the German people because it presented a true and powerful picture of the class or caste distinctions in their home land, while to foreigners it appealed as a stirring and skilfully written play. Two gloomy but truthful tragedies, *The End of Sodom* and *Magda,* followed, dealing with the strained, artificial life of the modern city. The last-named play has been presented in nearly every country of Europe and has met with success in America. Among other dramas that have made an international impression should be mentioned *Morituri, The Fires of St. John, The Joy of Living* and *Stone upon Stone.* Doubtless his most powerful novel is *It Was.*

The main ideas through all the work of Sudermann are the unnecessary strain, nervousness and violence of modern civilization, the emptiness of many of the so-called moral rules handed down from previous generations, and the right of every human being to a happiness which shall not be hampered by artificial conventionality. He uses these theories over and over, often with gloom and bitterness, but never without absolute truthfulness. As an unsparing investigator of modern social life he has few equals.

**SUE,** Marie Joseph Eugène (1804-1859), a French novelist, born at Paris. His father, who was a famous physician in Napoleon's army, left him a large fortune, and after some study of medicine in his native city and practice of it in the French army, Sue settled in Paris to devote his time to writing. He had been on the sea a great deal both as a boy and as a physician, and used his knowledge of ocean animals and plants in such weird romances as *The Salamander* and *Kernock, the Pirate.* These books appeared during the days of the romantic movement in French literature.

They were followed by novels dealing with the mysterious and the supernatural, with occasionally a touch of socialism, which was then gaining favor. Among the most noted of these stories were *The Mysteries of Paris* and *The Wandering Jew,* which showed extraordinary imagination and ability to impress upon the reader the idea of the horrible and uncanny. The plots, however, are very loosely constructed, and the style is often careless. The latter defect has been corrected in translations, and Sue is therefore still widely read and admired outside of France.

**SUEZ,** *soo ez',* a town in Egypt situated two miles north of Port Ibrahim, the harbor at the entrance to the Suez Canal. It is seventy-six miles east of Cairo, with which it is connected by rail, and is a seaport and coaling station. Formerly Suez was a prosperous trade center for the Orient, but notwithstanding improvements and increase of population since the opening of the canal it has remained unattractive and dreary. Only a small part of the vast commerce on the canal affects it. The original town has several mosques, and the houses are built of sun-dried bricks. Modern buildings, however, are found in the newer European section. The surrounding country is a desert. The exports are chiefly goods in transit. Population, about 18,000.




THE SUEZ CANAL AND COUNTRY EAST AND WEST

**SUEZ CANAL,** the longest ship canal of the world, extending in a north-and-south direction across the Isthmus of Suez in Egypt, connecting the Mediterranean and Red Seas. From Port Said on the Mediterranean, it extends to Suez on the Gulf of Suez, a distance of ninety-eight miles, twenty-one miles of which consists of small lakes. Its construction, shortening the route between England and India by 5,000 miles, has restored the Mediterranean to its ancient place as the most important highway of European and Asiatic trade.

This canal, built without locks, therefore known as a sea-level type, was first conceived by Napoleon when he occupied the town of Suez in 1798. A concession to build this canal was granted to Count Ferdinand de Lesseps, of France, in 1850, and work was begun April 25, 1859, the canal being opened for traffic ten years later, on November 9, 1869. Because of the large increase in traffic since its

construction, it has been widened forty-two feet and considerably deepened. Side basins are maintained to facilitate the passage of ships and in 1887 the waterway was lighted by electricity. Its cost of $90,000,000 is less than one-third of the cost of the Panama Canal, which is a lock canal, in which the water is raised nearly ninety feet. The management of the Suez Canal is directed by an international committee, and passage is given to ships of all nations on equal terms. Through the canal pass about 4,000 ships, which pay $25,000,000 in tolls in average years.

Being of such vast importance to English trade, the Suez became one of Germany's points of attack in the War of the Nations. During the year 1915, German troops penetrated Egypt a short distance west of the canal. They were unsuccessful, however, in an attack upon the city of Suez, which continued to be held by the English, or upon the canal itself. See Lesseps, Ferdinand de; Canal.

Consult Nourse's *The Maritime Canal of Suez.*

**SUFFRAGE,** *suf'rayj,* is the right to representation and participation in government affairs, through the medium of the ballot. The general idea of representation may be traced to the origin of the jury system, far back in the history of England. One of the great problems of the centuries in all countries where the betterment of the people has been sought has centered around the effort to have all classes fairly represented in government.

**In the United States.** During the early years of the United States, even with the broad principles contained in the Declaration of Independence, less than one-fourth of the men of the country were given the suffrage. There were religious and property qualifications and class distinctions. For many years Baptists, Quakers, Jews and Roman Catholics could not vote, but gradually the religious qualifications were removed. Later, property qualifications became unnecessary and class distinctions were forgotten. The United States Constitution has always recognized the right of each state to decide who should have the right to vote, even for officers representing the national government, only specifying that no citizen should be denied the right of franchise on account of "race, color, or previous condition of servitude."

The attainment of the twenty-first year of age is a qualification in every state. Universal manhood suffrage, which means the right of every adult male to vote, exists in every state except in a few where, for local reasons, special educational and property tests are required. In nearly half the states women may vote on school matters, and in several they have full suffrage rights.

**Related Subjects.** The following topics may be consulted in connection with this article on suffrage:

Australian Ballot
Ballot
Election
Short Ballot
Woman Suffrage

**SUGAR,** one of the most important foods known. It helps to form fat in the body, and is a source of energy and heat. It adds to the attractiveness of many other foods when employed as a sweetening, and if used in moderation makes them more digestible. The most common form—the lump or granulated sugar that appears on the table at every meal—is produced by extraction from sugar cane or sugar beets. Such sugar has a fuel value of 1,860 calories per pound, and is 100 per cent carbohydrate. Maple sugar is made from the sap of the sugar maple, and contains 83 per cent carbohydrates, 16 per cent water and 1 per cent ash. Grapes and the date palm are also sources of sugar, but they bear no comparison with sugar cane and sugar beets in respect to commercial importance. For a description of the sugar cane plant see the article following, Sugar Cane.

**Cane Sugar.** This is the product of a complicated milling process. The cane, after being washed and cut into short lengths, or shredded, is fed into a machine equipped with

ponderous rollers from eighteen to seventy-two inches in length, which squeeze the juice from the stock. Sometimes two or three sets of rollers are used, the pressure being increased from set to set. By this process from ninety to ninety-five per cent of the sugar in the cane is extracted. As the sugar passes from mill to mill, water at varying temperatures is sprayed upon it from a perforated pipe. The water assists in the grinding or macerating process and increases the amount of sugar extracted. The crushed cane, called *bagasse* (*ba gas'*), is utilized as fuel to provide steam for carrying on the operations. The juice then undergoes purification, which is accomplished by applying chemicals and by heating and filtering. Sulphur dioxide, which is used to bleach and disinfect the juice, further enables it to take up more lime—the most important chemical employed in manufacturing sugar. As soon as cane juice is squeezed from the cells of the stock, chemical inversion begins, that is, separation into fruit sugar and grape sugar. This injurious process is arrested by the addition of lime.

To produce the first sugars the purified juice is reduced to a syrup in evaporators and then boiled in open pans containing steam coils or in vacuum pans until the water is driven off and sugar crystals are formed. The resulting mass of crystals and syrup, called *massecuite,* is then carried to a mixing machine provided with revolving paddles, in which it is thoroughly stirred. From the mixer it is fed to revolving cylinders called *centrifugals,* in which the liquid portion is forced out through the meshes of a copper gauze basket. This liquid, after being boiled and reboiled, becomes the molasses of commerce. The sugar crystals must be further refined and clarified before ready for the market. Granulated sugar is formed in a revolving cylinder heated by steam, and loaf sugar is made by packing the fresh sugar in molds. The resulting blocks are then cut to the desired size and shape. Cheaper grades of sugar, known as *coffee* and *brown* sugar, are made from syrup yielded by first sugar.

**Beet Sugar.** Sugar was first extracted from the beet by a German scientist in 1747, but the industry was not developed until the nineteenth century. The beets, on reaching the factory, are first washed and conveyed to slicing machines, where they are cut by triangular knives into slices not unlike "shoe-string" potatoes. These slices drop through an upright chute into a diffusion battery, consisting of a series of tall cylinders holding from two to six tons each. These cylinders are known as *cells.* Warm water is run through the cylinders, passing from one to another throughout the battery, and drawing the sugar from the cells of the beets as it goes. This "diffusion juice," as it is called, contains from twelve to fifteen per cent of sugar. The pulp left over from this process is fed to stock. The raw juice is next purified by being mixed with lime and treated with carbonic acid gas. The purified juice is then carried to the evaporators, where heat is applied through steam coils. Having passed through the evaporators, usually four in number, the thickened juice is conveyed to vacuum pans and heated until crystals form. It is then treated in the mixer and the centrifugal machine like cane sugar. In America most beet-sugar manufacturers prepare their own raw sugar for the market by putting it through a

SUGAR PRODUCTION

The source of the greater proportion of three kinds of sugar.

refining process. When it is highly refined it cannot be distinguished from cane sugar.

**Production.** Though sugar production was affected by unprecented war conditions, the world's output of cane sugar in 1916 was estimated to be 11,410,260 tons, and that of beet sugar 6,135,000 tons. The European output of beet sugar was 5,275,000 tons, as compared with 846,000 for the United States and 14,000 for Canada. Louisiana is the leading cane-sugar state in the Union; the total output for the country in 1916 was 253,000 tons. For the yield in other countries see chart, page 5615.

**Maple Sugar.** The extraction of the sap of the sugar maple is a process that begins with the tapping of the trees in the late winter or early spring. A hole about an inch and a half deep is bored into the trunk, and into this hole

A TEST FOR PURITY

Pure sugar, when dissolved in water, should be so transparent that small type can easily be read through it.

is driven a metal or wooden trough with a bucket on the end to receive the sap. Each day the sap is collected and taken to the sugar house, where it is boiled until the water content has been drawn off. This process may take place in an ordinary kettle or in a modern steam-heated evaporator. The resulting syrup has so high a degree of purity that little clarification is necessary. Some of the syrup is poured into molds and left to harden into sugar. The black, silver and red maples and the box elder are all sources of maple sugar, but the greatest supply comes from the sugar maple. In the United States Vermont and New York are the leading maple-sugar states, but neither produces so much as the Canadian province of Quebec (see chart). The total annual output for the United States is about 14,000,000 pounds of sugar and 4,106,000 gallons of syrup. G.B.D.

## *A Booklet on Sugar*

Cover—In center, title, *The Story of Sugar;* at bottom, name of pupil, grade and school.

Illustrations: In lower left corner, sugar cane; in upper right corner, group of maple leaves.

Inside cover—Blank.

Page one—Essay, *Making Cane Sugar.*

Illustrations: Broken cane stalks; cubes of loaf sugar.

Page two—Essay, *Making Beet Sugar.*

Illustration: Heap of sugar beets.

Pages three and four—An original story, *When We Made Maple Sugar.*

Illustrations: Sugar maple; fire with kettle hanging above it.

Page five—Essay, *Where Sugar Is Produced.*

Illustration: Shaded maps.

Page six—Description of an experiment in crystallizing sugar (see article CRYSTALLIZATION).

Illustration: Drawing showing shape of crystals.

Page seven—Essay, *Uses of Sugar.*

Illustration: Sketches of various foods into which sugar enters largely.

Page eight—*My Favorite Candy Recipe.*

Inside back cover—Blank.

Back cover—List of all plants from which sugar is made.

Consult Geerlig's *Practical White Sugar Manufacture;* Koppeschaar's *Evaporation in the Cane and Beet Sugar Factory;* "Statistics of Sugar in the United States and Its Insular Possessions," in *United States Department of Agriculture Bulletin No. 66.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Carbohydrates | Maple |
| Food, subhead | Molasses |
| *Chemistry of Food* | Vacuum Pan |

**SUGAR CANE,** a giant perennial grass cultivated in tropical and semitropical countries, the source of about half the sugar of commerce. Sugar cane gives off, from a thick, solid rootstock, numerous erect stems that grow from ten to fifteen feet in height and are from an inch to two inches in diameter. The stalk has no branches, but bears, in the upper portion, several long and narrow leaves which are arranged in two rows. The stalk is divided into numerous short sections, sometimes sixty to eighty in number, which are connected by

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## SUGAR INDUSTRY.

Planting sugar cane in Peru, and a cane harvest in the same country. Below: Cane field in Porto Rico.

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## SUGAR INDUSTRY.

At top: Sending cane to mill in a flume, in Hawaii. Bottom: Left, cane grinding in Jamaica; right, women field laborers, Jamaica.

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**BEET SUGAR.** Above: Evaporators where the juice is boiled to a syrup. Below: Centrifugals, where crystallized sugar is separated from the syrup by whirling.

WORLD BOOK

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MAKING LOAF SUGAR.

Moving drying ovens in a New Jersey refinery

nodes, the sections between being known as internodes. Each node bears a small bud that looks very much like the eye of a potato. The color of the stem varies for different kinds of cane, some being yellow, others reddish, and still others green- and white-striped. Sugar cane flowers only in tropical countries, but even there some varieties never blossom. The chief sugar-cane regions in the world are British India, the West and East Indies, the Hawaiian Islands and Louisiana.

**Growth and Cultivation.** The soils best adapted to the growing of cane are those that have a high degree of fertility and that are also capable of retaining a large amount of moisture. This plant requires an abundance of water, and if the rainfall is not adequate, excellent results are obtained by irrigation. A heavy subsoil of clay is of value in preventing the washing away of soluble plant food, especially where a considerable amount of irrigating is resorted to. The alluvial soil of Louisiana (containing deposits of mud, sand and gravel) yields splendid crops of cane, but there drainage is very important, in fact, almost essential. The soils of the Hawaiian Islands, which yield the heaviest crops of sugar cane in the world, are rich in lime, potash, phosphoric acid and nitrogen.

Sugar cane is propagated for the most part by stem cuttings; seed is used principally for cross-fertilization and to produce new varieties, but not all varieties of cane bear fertile seeds. Planting may take place either in the spring or fall, the latter when the spring and summer seasons are so short that spring planting might endanger maturing of the crop. If planted in the fall the canes come up earlier, and earlier grinding is possible. A field prepared for planting has great furrows, from five to seven feet apart, running from one end of the field to the other. In these the cuttings are laid horizontally, sometimes singly and often two or three abreast. Some planters use only the upper portion of the cane for planting, some the entire cane. Others recommend planting only the matured portion. The upper portion is considered best for seed.

After the cuttings have been planted, soil is thrown over the furrows until the cane is covered. In a short time the buds borne on the nodes swell and burst, and a young stalk of cane emerges from the soil. Soon the leaves begin to appear, and in a few weeks the nodes and internodes may be seen. Cultivation should begin as soon as the cane has a good start, for the field must be kept free from weeds and grass. The upper part of the soil should be tilled frequently, and two or three hoeings are also beneficial. The cane grows rapidly under favorable conditions.

**Harvesting.** In the United States the harvesting period is from October to January (for spring-planted cane); in tropical countries, from January to the middle of summer. Though cane-cutting machines are in use to some extent, they give less satisfactory results than hand cutting. On large plantations scores of cutters are employed, each of whom is provided with a large steel knife carrying a blade five inches wide and eighteen inches long, and having on the back a small hook. As the cutters work their way down the long rows, they cut the cane close to the ground, stripping off the leaves with the hook, and topping the stalks at the last matured joint. The cut stalks are thrown into heaps called windrows, then gathered up into carts to be carried to the sugar factory. The stubble left in the field will produce a second or third crop in Louisiana, and from five to ten crops in tropical countries. Annual or biennial planting, however, gives the most satisfactory results. G.B.D.

For description of the process of extracting sugar from the cane, see the article SUGAR, where there is also an illustration of growing sugar cane. Consult Jones and Scard's *Manufacture of Cane Sugar.*

**SUGGESTION,** *sug jes' chun,* the influencing of conduct by presenting a pattern for imitation, or indirectly inviting a desired and natural reaction. It commonly carries the implication that the process is introduced unawares, without arousing the consciousness of the "suggested" person in the direction of the suggested response. The mechanism by which yawning is contagious is rather obvious; the sight of another yawning intensifies or releases slight tendencies in the same direction; the sight of others eating makes one hungry. When a lecturer, to illustrate the point, moves his hands open and shut, like a pair of jaws, and induces a yawn among the more responsive of his audience, the mechanism is a little more indirect.

The mechanism of suggestion in the way of inducing belief is equally important. This appears realistically in the psychology of *conjuring* (which see). When all the movements of throwing a ball into the air are performed the spectator is convinced by the suggestion of the appearance that he saw the ball in the air

(when actually it was dropped under a table), or, again, the spectator is convinced that coins are dropped into a hat by the tossing movements of the right hand (which is quite empty), when really the coin is dropped from the left hand which holds the hat. The illusion—as is true of many illusions—is the result of suggestion. Similarly, an inference is drawn from a set of premises suggestively arranged; as in the methods of a criminal in establishing an alibi or covering up his tracks.

Suggestion refers also to the process of inducing consent without arousing opposition. Children must be guided by suggestion as often as by command. As soon as the will realizes that it is being led, it asserts its self-direction; suggestibility is a ready acquiescence, a will that yields easily to another's direction. It is along the same lines that an undesirable belief or a symptom is removed by suggestion; a sugar pill may be given as medicine with the suggestion that it will have a desired effect, and the effect follows; a mock operation may be gone through with and the patient, convinced of a cure, finds himself rid of the trouble.

Suggestion as a procedure enters into the psychology of many practices (see FAITH CURE; HYPNOTISM). Normal suggestibility has its limits; it must as a rule proceed cautiously and indirectly; abnormally it attains almost incredible proportions and may proceed openly and forcibly. The psychology of persuasion (as an example, Antony's oration over the body of Caesar) and the psychology of advertising must likewise study the subtler suggestive tendencies of the mind that influence action. J.J.

**Relating to Various Beliefs.** The articles on the following topics, while not bearing on the subject of suggestion, are of interest in this connection:

Alchemy
Astrology
Clairvoyance
Conjuring
Demonology
Divination
Faith Cure
Hypnotism
Magic
Medium
Mesmerism
Mind Reading
Necromancy
Occult
Palmistry
Phrenology
Physiognomy
Psychical Research
Psycho-Analysis
Spiritualism
Subconscious
Superstition
Telepathy
Theosophy
Trance
Witchcraft

**SUICIDE,** *su'i side,* intentional death by one's own hand. Attempts have been made to show that the tendency toward suicide is an accompaniment of civilization—that a savage never takes his own life. While the facts do not support this extreme view, it is true that it is much less common among barbarous than among civilized peoples.

Christianity has always opposed suicide, accounting it a sin; and statistics show that the deterrent effect of religion is very great. It is true that in practice the appeal of religion on this subject is not always to the highest emotions, but that it often deters through threats of punishment after death. Among Christian people, suicide is far more common with Protestants than with Catholics.

**Public Records.** Statistics on the subject of suicide are rather meager and unsatisfactory, for there are usually reasons for secrecy regarding the facts in a case, and many instances of suicide are not so reported. There is, however, sufficient statistical material to show certain very marked tendencies, some of which seem almost unaccountable. That there should be differences in nationalities might be expected, not only on account of climate, but on account of national divergences of temperament; and these differences are very marked. Saxony leads all other countries in relative number of suicides, and is followed by France, Switzerland, Denmark, Prussia, Belgium, Sweden, England and Wales, the United States, Norway, Scotland and Ireland in approximately the order named. The difference between the extremes is great, Saxony having about twenty times as many suicides to a unit of population as has Ireland.

**Proportion of Women.** The difference between the sexes is also very marked, and the proportion varies little from year to year, or in different countries, approximately three or four males committing suicide to each female. The modes chosen by men and women vary, too, men choosing hanging or cutting most frequently, while women prefer drowning or poison. As to age, there are evident certain definite tendencies. Children from five to ten have been known to commit suicide, but the number of these is small. Above the age of ten the number steadily grows, until the maximum is reached between fifty-five and sixty-five. These figures concern the aggregate—men and women together. In general, it may be said that the age at which women tend to commit suicide is much lower than that for men, pointing, doubtless, to a decided difference in cause.

**Classes Most Susceptible.** Other facts shown by statistics are that single people commit suicide oftener than married people; that professional classes and military men show a far

greater tendency toward self-destruction than do the laboring classes; and that the late spring and early summer months without exception show more suicides than do the remaining months of the year. A curious fact is that suicide seems at times to become epidemic, the force of example being doubtless the determining cause. Though statistics are not exact enough to establish such a point beyond question, it seems that the propensity to commit suicide is increased by education.

At various times laws have been passed which aim to serve as deterrents from suicide, but they are not effective; one knows that if he succeeds in his attempt at self-destruction the law will be powerless. In England suicides were formerly denied Christian burial, and their property was confiscated. In the United States attempted suicide is not in general considered a crime, but it ranks in some states as a felony, as does also aiding an attempt at suicide. In New York aiding a suicide is manslaughter in the first degree. A.MC C.

Consult the Bureau of the Census of the United States for American statistics; also Strahan's *Suicide and Insanity.*

**SUL'LA,** Lucius Cornelius (138-78 B.C.), a Roman general and statesman, known as Felix (The Fortunate), and famous as the opponent of Marius. He was of patrician rank, received an excellent education, and entered the army, seeing his first military service of note in the campaigns of Marius against Jugurtha in Africa. Here he was very successful, as he was also in the wars against the Teutones and Cimbri, which raised Marius to the height of his power. In 93 B.C. he was made praetor, in the next year went as governor to Cilicia, and on his return to Rome in 91 did such excellent service during the Social War that Marius became intensely jealous of him. As a reward for his successes he was made consul in 88 B.C. and intrusted with the conduct of the war against Mithridates, an honor which Marius greatly desired, and the result was a riot, headed by the adherents of Marius, which compelled Sulla to escape from Rome to his troops in Campania. At the head of his legions he returned to Rome and drove out Marius.

From 87 to 83 he was engaged against Mithridates, whom he at last forced to submit to Rome, and on his return found himself very powerful, Marius having died during his absence. The Marian party, however, had still to be crushed, and this Sulla accomplished by the beginning of 81 B.C.

He celebrated his victories by putting to death thousands of his enemies throughout Italy, instituting a veritable "reign of terror;" then he had himself declared dictator for an unlimited term. The laws which he promulgated were all directed toward the restoration of the powers of the Senate and the aristocratic party. In 79 B.C. he resigned, and spent his last year in retirement.

Consult Oman's *Seven Roman Statesmen;* Beesly's *The Gracchi, Marius and Sulla.*

**Related Subjects.** The reader may consult the following articles in this connection:

Marius, Caius
Mithridates
Patrician
Praetor
Rome, subhead *Last Century of the Republic*

**SULLIVAN,** *sul'i van,* Sir Arthur Seymour (1842-1900), an English composer who won fame both in the field of light opera and in sacred music, was born in London. His father was an Irish bandmaster and music teacher of much ability, and the son so early learned the rudiments of the art that at the age of eight he could play any wind instrument. When he was twelve years old he was admitted as a singer in the Chapel Royal at London and two years later won the Mendelssohn scholarship at the Royal Academy of Music. Under this scholarship he studied in the Academy and in Leipzig Conservatory. In 1861 he returned to London, and early in the next year his music to Shakespeare's *Tempest* was played in the Crystal Palace. The occasion was a genuine triumph for him and he determined to devote most of his time to composition.

For some years he was organist at Covent Garden theater, London, and professor of composition at the Royal Academy, but after 1875 practically all his energies were devoted to collaboration with W. S. Gilbert in the production of their famous light operas. He died suddenly of heart failure in London on November 22, 1900, and was buried amidst remarkable demonstrations of national sorrow in Saint Paul's Cathedral.

Sullivan accomplished the unusual feat of producing artistic music which was genuinely popular with the masses of the people. His earlier works, such as the *Kenilworth Cantata,* with its beautiful duet, *How Sweet the Moonlight,* and the songs from Shakespeare such as *Oh, Mistress Mine* and *The Willow Song,* are universally admired, while the operas written with Gilbert, such as *H. M. S. Pinafore, Pirates of Penzance, The Mikado* and *The Rose of*

*Persia,* became known around the world. It should not be forgotten that Sullivan also composed sacred music of an unusually high standard. His *Te Deum, The Light of the World, The Golden Legend,* and his hymn, *Onward, Christian Soldiers,* are among the most notable specimens. His *Lost Chord* has been declared one of the most successful songs of the nineteenth century. R.D.M.

**SULPHATES,** *sul'fayts,* are salts of sulphuric acid. As a rule they are stable crystalline compounds, more or less soluble in water, with the exception of barium, strontium and lead sulphates. These salts are very important. The following minerals—heavy spar, gypsum, celestine and epsom salts—are sulphates of barium, calcium, strontium and magnesium, respectively. Copper sulphate, or blue vitriol, is used in a variety of industries, including dyeing and calico printing; iron sulphate is used in making ink and as a medicine; manganese sulphate is employed in calico printing; zinc sulphate in surgery, in calico printing and in drying oils for varnishes. A double sulphate of potassium and aluminum, known as alum, is a constituent of some baking powders.

**Related Subjects.** The following articles in these volumes should be read in connection with this subject:

| | |
|---|---|
| Alum | Gypsum |
| Barium | Magnesium |
| Blue Vitriol | Strontium |
| Calcium | Sulphuric Acid |
| Epsom Salts | |

**SULPHUR,** *sul'fur,* a substance that is found in abundance in nature and used in modern industry in the manufacture of a great number of important products. It occurs either in a pure state, or in combination with other substances, mostly metals, with which it forms valuable metallic ores, such as pyrite, which is a sulphide of iron; galena, which is a sulphide of lead; cinnabar, which is a sulphide of mercury; and barite, which is a sulphide of barium. In a pure state it occurs in great abundance in the neighborhood of volcanoes, both active and extinct. It has therefore been known from the earliest ages, and on account of the low temperature at which it burns it is called *brimstone.* Sulphur frequently occurs in a pure state in beds of gypsum or clay, which is itself a sulphate of calcium.

Eggs and several vegetables, such as onions, garlic, horse-radish and mustard contain sulphur. It is also one of the elements found in the human body; it is estimated that the human body contains about a quarter of a pound of it. Sulphur is also found in coal and petroleum.

**Properties.** Sulphur is a chemical element (symbol S; atomic weight, 32). After carbon it is the most important of the nonmetallic elements. Ordinary sulphur is a solid substance, yellow in color, almost tasteless, and when rubbed or melted it emits a peculiar odor. It is not a good conductor, either of heat or electricity. Sulphur melts at the comparatively low temperature of 230° F. It possesses the peculiar property of becoming viscous or of solidifying when heated to a higher degree. At about 480° F. the fluid is so thick that it cannot be poured from the vessel, but it becomes again fluid when the temperature is raised above that point. Sulphur boils at 792° F., emitting a yellowish-brown vapor, which condenses in closed vessels in the form of a fine, yellow powder called flowers of sulphur. The roll sulphur of commerce is made by pouring sulphur in fluid state into cylindrical molds, where it is cast.

Sulphur ignites readily at a low temperature and burns with a pale blue flame, forming sulphur dioxide, which is a colorless gas. It also combines readily with hydrogen, forming sulphureted hydrogen, and with chlorine, carbon and a great number of metals. Divided into very fine particles, it oxidizes in moist air and forms sulphuric acid. This process takes place in the atmosphere of large cities which burn a large amount of coal and gas.

**Where Sulphur Is Found.** Until a few years ago most of the sulphur used in commerce came from the large deposits of pure sulphur found in Sicily. To-day large quantities are extracted in the United States. The chief American source of supply is Sulphur, in Calcasieu Parish, Louisiana, where the sulphur is extracted from the deep-lying beds by an ingenious process. Sulphur is also obtained in small quantities in Texas, Wyoming and Nevada. The production of sulphur in the United States amounts to about 350,000 tons a year; in 1900 it was 3,147 tons. Deposits are also found in Chile, Peru, New Zealand, Japan and some parts of Asiatic Russia.

**Its Uses.** Sulphur finds a great number of uses in modern industry, chief among them being the manufacture of sulphuric acid, gunpowder, matches, fireworks and in vulcanizing rubber. It is also used in medicine, and its compounds are utilized in the manufacture of a great number of products. O.B.

**SULPHURETED HYDROGEN,** *sul fu ret' ed hi' dro jen,* or **HYDROGEN SULPHIDE,** *sul' fide,* a poisonous gas with the odor of rotten eggs, is a compound of sulphur and hydrogen. It occurs in mineral waters, and wherever organic compounds containing sulphur are decomposed, as in the air about cesspools and sewers. It is made in the laboratory by the action of hydrochloric acid on iron sulphide. The gas burns with a bluish flame, is colorless and has a sweet taste, and is soluble in water. The solution reddens litmus, and when it decomposes it deposits sulphur. Sulphureted hydrogen is a strong reducing agent, and is useful in the manufacture of anilines. Dissolved in mineral waters, it has medicinal properties in rheumatism and skin diseases. The chemical formula for hydrogen sulphide is $H_2S$.

**SULPHURIC ACID,** *sul fu' rik as' id,* or **OIL OF VITRIOL,** *vit' ri ul,* an oily liquid manufactured in great quantities for use in numerous industries. This acid is indispensable in the manufacture of artificial fertilizers, alum, nitroglycerine, glucose, phosphorus and dyestuffs, and in the bleaching, electroplating, oil refining and mining industries. It is employed in the making of sodium carbonate (soda), which in turn is used in manufacturing soap and glass, and is an essential factor in the production of all other mineral acids. The manufacture of sulphuric acid is based upon the fact that it is formed when sulphur dioxide, the common compound of sulphur and oxygen, oxidizes in the presence of water.

The acid is a combination of hydrogen, sulphur and oxygen, its chemical formula being $H_2SO_4$. When pure it is colorless and odorless. It has great affinity for water, which it absorbs quickly from many organic substances. For this reason it makes painful wounds if it touches flesh. It chars wood, paper, starch and sugar, and is often employed in the laboratory to dry gases, for it absorbs moisture from the air and from gases passed through it. Four parts of acid to one part of water raises the temperature of the water to boiling, and if the two are mixed the acid should be poured into the water, not vice versa; otherwise the containing vessel may be cracked by the sudden access of heat. The acid is supposed to have been known to Arabian alchemists of the tenth century. In the fifteenth century a German chemist, Basil Valentine, described its preparation. It was then known as oil of vitriol, as it was made by heating a mixture of green vitriol and sand.

**SUL'TAN,** an Arabic title of honor, used since about A.D. 990 and applied to Mohammedan princes and rulers. The word means *emperor* in the modern sense, but more anciently referred rather generally to one who was mighty or imperious. The sultan of greatest dignity is the ruler of Turkey, and to set him apart as greater than any other bearing the title he is officially known as *sultan khan,* or *reigning sultan.* The form *sultana* is applied to the mother, wife, or daughter of the sultan.

**SULTE,** *suhlt,* BENJAMIN (1841- ), a Canadian poet and historian, author of the *Histoire des Canadiens-Français* (History of the French-Canadians), a standard in its field. Sulte was born at Three Rivers, Que. After the early death of his father he left school and had to work for a living. He drifted through various employments until he finally entered the service of the Dominion government as a translator. He was in the government service for thirty-five years. In addition to the solid eight-volume *History of the French-Canadians,* Sulte wrote a *Histoire de St. François du Lac* (History of Saint Francis of the Lake), a history of Quebec and two volumes of verse, *Les Laurentiennes* and *Les Chants Nouveaux* (New Songs). Much of his work has appeared in journals and periodicals.

**SU'LU ISLANDS,** an archipelago consisting of more than 190 islands, lying between the Celebes and the Sulu seas, off the northeast coast of Borneo (see colored map, with article OCEANIA). They are the most southerly group of the Philippines, and have a combined area of about 1,560 square miles. The natives are chiefly Moros. For governmental purposes the Sulu Islands constitute a district of the Filipino province of Moro. The islands produce a great quantity of valuable wood, including teak, sandalwood, bamboo and palms. Rice, cocoa, maize, bananas, oranges and mangoes are cultivated, and there is an extensive trade in pearl shells. Oxen, swine, goats and poultry are abundant, and wild boars and deer are common.

**SUMAC,** or **SUMACH,** *su' mak,* a group of small trees or shrubs of temperate regions, consisting of about 120 species, many of which are commercially important. Of the North American sumacs one of the best known is the *staghorn,* whose range is from Southern Canada to Georgia and Mississippi. It is an attractive flat-topped tree, growing thirty or thirty-five feet high and bearing fernlike leaves, small, greenish flowers and tiny red berries. In the autumn

the foliage of this sumac is a wonderful combination of flaming scarlet, orange and purple, but the summer leaf is velvety, dark-green above and pale beneath. The branches of the tree are forked many times, and before it is mature they are covered with a soft, velvety down. The fruit clusters and leafstalks are extremely hairy. From the soft, brittle wood are made walking sticks and inlay work for boxes and ornamental objects. Not less attractive than the staghorn is the *dwarf, black* or *mountain* sumac, found all over the Eastern United States and beyond the Mississippi River west to the Rockies. In the Tennessee and North Carolina mountains it grows as tall as the staghorn, but is usually a shrub. As its leaves are rich in tannin they are employed in tanning leather, and from them is extracted a yellow dyestuff.

A sumac bearing white berries is found in swampy land from New England to Minnesota and from Georgia to Texas. This is the *poison* sumac, which all people should avoid. Like its harmless relatives, it is a tree of beautiful foliage, but can always be recognized by its fruit, which hangs in drooping clusters. The red berries of the harmless sumacs are in dense, erect clusters. The *smooth-leaved* sumac, which usually grows only three feet high, is a species found east of the Rocky Mountains, from Arizona to British Columbia. The unripe summer berries are used in making a refreshing drink, and the bark, leaves and fruit are used in treating fevers.

Among the sumacs of the eastern hemisphere are the *Venetian,* a plant used in Italy for tanning; the *elm-leaved,* whose fruit is valued as a condiment; the *Japan varnish tree,* which yields a varnish used in lacquer work, and a seed oil employed in making candles; and an Australian species whose wood is much valued by furniture makers. M.K.

**SUMATRA,** *soo mah' tra,* the second largest island of the Sunda group, in the Indian Ocean, one of those rich Oriental lands which contribute their wealth to European owners and rulers. In this instance the proprietor is the Netherlands. (See map, accompanying article Asia or article Oceania.) Lying across the equator, southwest of the Malayan peninsula, having an area of 180,000 square miles, Sumatra resembles California in shape and is about 20,000 square miles larger than that American state. However, Sumatra's population, which is 4,029,000, of which number less than one per cent are Europeans, is about double that of California. The mountains are rich in minerals; the forests furnish teakwood, bamboo and valuable gums; in the fertile valleys grow the pepper and tobacco of Sumatra's important European and Chinese trade.

Inhabited by several different savage tribes of Malayan and Hindu origin, one of which, the Kubu, is the most uncivilized tribe known, the island has presented many governmental difficulties to the Dutch, who have held Sumatra as a colony since 1600. Europe first heard of Sumatra through a Portuguese explorer in 1508, and the first European trading posts on the island belonged to Portugal. In the seventeenth century the British founded a colony on the southwest coast, but after a long period of rivalry with the Dutch, they withdrew in 1824.

The Dutch governor-general, assisted by a council and the resident governors of the various districts, has absolute authority, except that he is responsible to the home government. The natives take little part in governmental and commercial affairs, and are chiefly occupied in cultivating the soil, raising cattle, fishing and in gathering the riches of the forests for white men.

There are few large cities; the most important of these are Palembang, in the southeast, and Bencoolen and Padang, on the west coast. Dutch engineers have built highways connecting the east and west coasts, military roads and two railroad lines from Padang. E.B.P.

Consult Cabaton's *Java, Sumatra and the Other Islands of the Dutch East Indies.*

**SUMMERLAND,** *sum' er land,* a town in Southern British Columbia. It is prettily situated on the west shore of Okanagan Lake, ten miles by steamer north of Penticton, which is at the foot of the lake. At Penticton connection is made with the Kettle Valley Railway, and at Okanagan Landing, ninety-four miles north of Summerland by steamer, with a Canadian Pacific branch which runs to the main line at Sicamous. Population in 1916, about 2,000.

Like Penticton and other towns in the Okanagan Valley, Summerland is a large fruit-producing center, especially for peaches. Mixed farming and cattle raising is carried on a few miles away from the lake, but the front land is too valuable for these pursuits. Lumbering is an important industry in the vicinity, and the town makes large quantities of fruit boxes and crates. A Dominion experimental farm adjoins Summerland on the south. The electric light and water plants, as well as the irrigation

system, are owned by the municipality. Okanagan College, which was temporarily closed in 1917, is located here.

**SUMMERSIDE,** *sum'er side,* a town in Prince Edward Island, the county town of Prince County. It is on the south side of the island, on Northumberland Strait, and is on the Prince Edward Island Railway. The harbor is large and deep enough for ocean-going vessels. Summerside has an export trade in lobsters and oysters, the latter coming from the famous Richmond Bay fisheries, three miles away. The town is also noted as the center of the fox-raising industry on the island. Population in 1911, 2,678; in 1916, estimated, 2,800.

**SUM'NER,** Charles (1811-1874), an American statesman of the period of the War of Secession, one of the most outspoken and fearless of the antislavery leaders. Lincoln spoke of him as "my idea of a bishop," because he so courageously denounced whatever he thought to be wrong. Sumner was born in Boston. After completing a course at the Harvard Law School he was admitted to the bar (1834). Between 1837 and 1840 he traveled in Europe, and on his return home began actively to oppose the extension of slavery. In 1851 the Free-Soil party of Massachusetts, by combining with the Democrats, brought about his election to the United States Senate, and he was a member of that body until his death.

CHARLES SUMNER
For over twenty years a Senator of the United States.

Sumner's zeal as an antislavery leader led to an assault upon his person. In 1856 he delivered a fiery speech entitled *The Crime Against Kansas,* in which he severely criticized one of the Senators from South Carolina. In retaliation a Southern congressman, Preston Brooks, attacked him with a cane while he was alone in the Senate chamber, injuring him so seriously that for three years he was unable to appear in public life. Late in 1859 he resumed his place in the Senate, and for ten years following 1861 he served as chairman of the Committee on Foreign Relations. He was an ardent worker for enfranchisement of the negro, and he approved the impeachment of Johnson.

In 1872 Sumner joined the Liberal Republicans, whose candidate for the Presidency was Horace Greeley, for he disagreed with Grant on the latter's home and foreign policies. It is especially to the credit of Sumner that he was one of the first to advocate civil service reform.

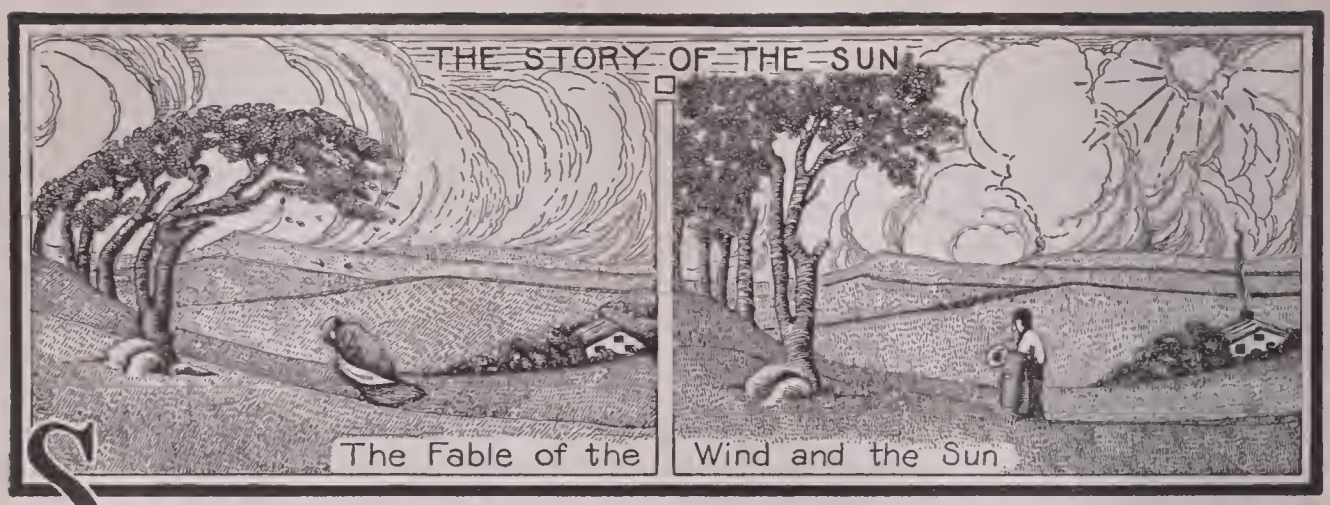
**SUMPTUARY,** *sump'tu a ri,* **LAWS.** The word *sumptuary,* like *sumptuous,* comes from a Latin word meaning *expense,* and sumptuary laws are regulations to limit the amount of money spent on private luxuries. Modern political economy does not consider such laws legitimate because they interfere with personal liberty; but the idea in the past was that by checking extravagance authorities could lessen poverty and crime.

The sumptuary laws of ancient Greece and Rome forbade elaborate funerals, costly banquets, and gold and silver embroidery on women's robes; at one time, indeed, there was a Roman edict punishing guests as well as hosts if the entertainment was more lavish than the laws permitted. Similar laws have been common at various times in England, France, Scotland, Spain and Italy. From the time of Edward III until the Reformation the English Parliament regulated the number of courses to a meal—two except on holidays—and the dress expenditure for each class of society. Only the very wealthy might wear silk, this restriction being intended in part to encourage woolen manufacture in England.

The nearest approach we have to-day to sumptuary laws is found in legislation covering the liquor traffic, such as license and prohibition laws. However, as their primary purpose is to protect public health and morals, they are generally considered as coming under the head of police regulations. See Blue Laws.

**SUM'TER,** Fort. See Fort Sumter.

**SUMTER,** S. C., the county seat of Sumter County, is centrally located in the state, forty-three miles southeast of Columbia, the state capital, and eighty-three miles northwest of Charleston. It is on the main line and several divisions of the Atlantic Coast Line Railroad, and on the Carolina, Atlantic & Western road. Sumter is a center of cotton trade and has cotton compresses, cotton and cottonseed-oil mills and manufactories of furniture, telephones, golf sticks and other commodities. The place was settled in 1800 and became a city in 1887. In 1913 it adopted the commission form of government. The population in 1910 was 8,109; in 1916 it was 9,639 (Federal estimate). The area exceeds three square miles.



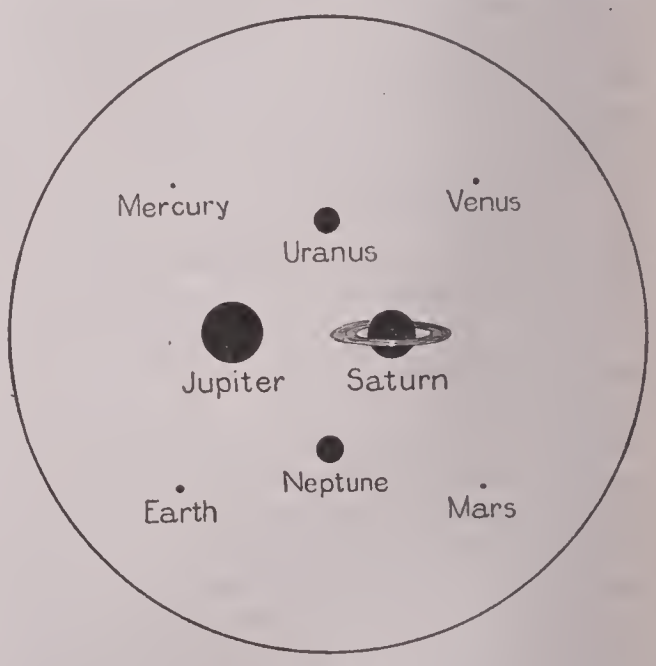

SUN, the most conspicuous of the heavenly bodies and the center of the solar system, regarded by astronomers as a star, and believed to be a gaseous mass, perhaps similar to the nebula from which the universe may have been evolved. The earth is dependent on the sun for heat and light; no form of life could exist on the planet we inhabit if the influence of the sun were withdrawn. To us on earth the sun is therefore by far the most important object in the solar system; in reality, though, it is only one of thousands of stars, and not even one of the largest. The stars are centers of their own systems.

**The Sun's Surface.** All that can be seen of the sun by an observer on the earth is merely its shining surface, so intensely bright that the naked eye cannot endure to look at it. Astronomers call this shining surface the *photosphere*. A cloak, or envelope, of burning hydrogen, surrounding the sun, is called the *chromosphere*, which shows red, like a burning mass, through the spectroscope. The prominences observable are vast planes of hydrogen extending up through the chromosphere, thousands of miles high, beside which the earth would be but a speck. During eclipses there may be seen a still more vast, luminous envelope, called the corona.

**Size and Density.** The diameter of the sun is 866,500 miles, or 109½ times that of the earth; its distance from the earth, about 93,000,000 miles. It would take fourteen years for sound to travel from the sun to the earth. If an explosion occurred on the sun and the sound could possibly travel so far we should hear the explosion fourteen years after it had happened. The sun's volume is 12,000 times and its surface area 1,300,000 times that of the earth. Its density is 1.41 times that of water, so it is much less dense than the earth, whose density is 5½ times that of water.

**Gravity** on the sun's surface is 27.6 times as great as on earth; a person weighing 150 pounds on earth would weigh nearly two tons on the sun, and a body falling on to the sun's surface would fall 444 feet the first second, while on the earth the fall the first second would be 16.08 feet. On the sun's surface, if it were possible to get there, a human being could not lift hand or foot, but would probably be crushed by his own weight.

**Apparent Motion.** To dwellers on earth the sun appears to move through the heavens. As a matter of fact, the earth moves round the sun, but we are unable to feel that motion. In the spring the sun rises a little farther north of east each day for three months in the northern hemisphere. At the summer solstice, it appears to stay at the same height for a few days, then starts on its journey southward. It not only moves north and south, but continually advances eastward among the stars, ro-

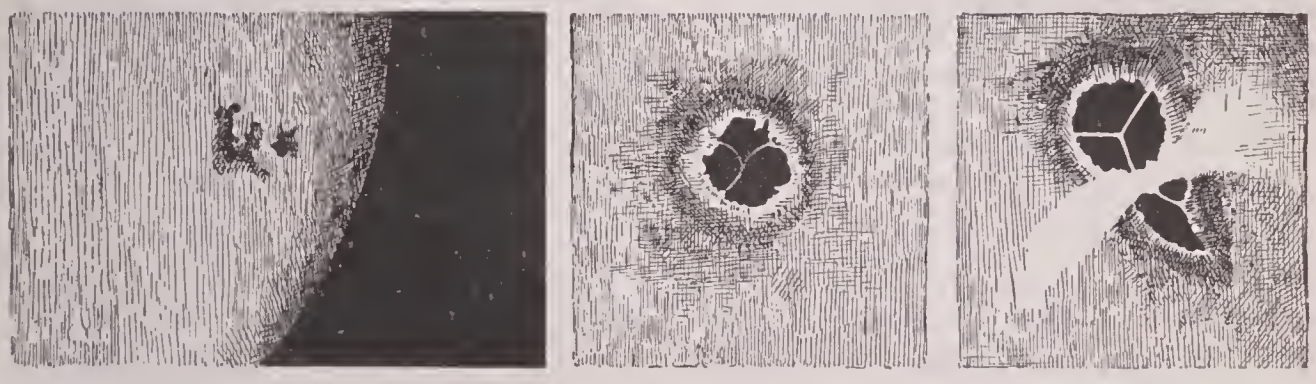



COMPARATIVE SIZES
The sun is represented by the large outer circle.

tates on its own axis in twenty-six days, and completes a circuit of the heavens in a year.

**Composition and Heat of the Sun.** What is behind the photosphere and the chromosphere, what the sun consists of in its interior, is still more or less a matter of conjecture. The sun apparently burns, but not in the same way that a piece of wood burns and is consumed. If the sun is cooling, the process is so gradual as never to have been in the slightest degree noted. Since the earth has been inhabited there has been time for the sun to burn itself out, but it is agreed that it still contains enough heat to supply the earth for at least 10,000,000 years. In the gaseous mass composing the sun are present iron, titanium, calcium, manganese, nickel, cobalt, chromium, barium, sodium, magnesium, copper, hydrogen, zinc, sulphur, cerium, strontium and potassium; each of these is described in its place in these volumes. The amount of heat received by the earth from the sun in a year would melt a covering of ice 124 feet thick all over the surface of the earth, and if the rays from the sun could be all concentrated on to a bridge of ice 2½ miles thick reaching from the earth to the sun, the heat would be sufficient to melt that bridge in one second. Only a very small portion of the heat radiated by the sun reaches the surface of the earth, and the portion which does reach the surface does not come direct, or it would scorch and destroy all plant and animal life. The earth is still further protected by its inclination on its axis, or the angle at which it journeys round the sun, causing the sun's rays to fall obliquely on its surface. If the same face of the earth were always turned toward the sun, one-half would be always in the light and heat, the other half in perpetual darkness and cold.

**Sun Spots.** The surface of the sun appears to be dotted with dark patches, irregular in shape and varying in diameter from 100 to 100,000 miles. These are called *sun spots,* and it is observed that they become more numerous at regularly recurring intervals. Although apparently dark, sun spots are only dark in comparison with the rest of the sun's surface. In reality, the light of even the darkest of sun spots far exceeds limelight in brilliance. The brightest part of an electric arc light is the nearest approach to the light of the sun, but even that is not one-quarter as bright as the solar surface. It is of course quite impossible to examine sun spots with the naked eye. Colored or smoked glass screens should be used to prevent the glare from damaging the eyes. The Carothers Observatory, Houston, Texas, suggested a practical method for observation of sun spots as follows:



SUN SPOTS, REPRODUCED FROM PHOTOGRAPHS

At left, spots seen near edge of the sun. The second illustration shows a spot, rounded at first, finally becoming bridged over with projections, as seen in the third picture.

"If images of the sun be formed through clean-cut, round holes of proper size in a darkened room, at sufficient distance from the aperture and cast upon white paper or cardboard, sun spots of ordinary size may be readily seen on the image."

This would enable amateurs to note the progress of the spots across the solar disk and to compile interesting records. By observation of sun spots which pass round the sun, the time of the sun's rotation is calculated. The spots are apparently not attached to the sun's surface but float about somewhat as clouds do in our atmosphere, causing differences in the calculated time of rotation according to the points from which spots are observed. The theory that sun spots are cavities filled with cooler gases than those in the surrounding region has been practically proved incorrect. It might be concluded that sun spots are really eruptions breaking through the photosphere.

**Influence of Sun Spots.** It has been clearly established that when sun spots are most numerous magnetic storms are frequent and violent on earth; it is also believed that the brilliance of the aurora borealis is directly con-

nected with the presence of an unusual number of sun spots. They are also said to influence temperature and rainfall, though no direct connection has yet been traced. Sun spots are periodic in appearance, the average period being 11.1 years, but subject to variation. During the times of the greatest number of sun spots, called the maximum, from twenty-five to fifty spots may be observed at once. Many weeks and even months may pass, however, without one being visible.

**Solar Photography.** In solar observation, as in all other branches of astronomy, photography has proved of the utmost value. Special appliances and lenses are, of course, necessary, the photographs being taken instantaneously. The pictures obtained are usually from two to eight or ten inches in diameter, but some of the best have been enlarged up to forty inches in diameter. In observations of sun spots photographs are particularly valuable, as they record the position and shape of the spots exactly as they were at the instant of exposure and not as they might *appear* to the human eye.

**The Corona.** The corona, one of the most remarkable of nature's phenomena, is visible only during the total eclipses, and then only for a very few minutes. It composes the outer envelope, crown, or halo, of the sun. The inner portion of the corona is intensely bright and dazzling, tapering in the outer corona to a soft, filmy, light with streamers spreading millions of miles into space. Astrophotography has been the means of reproducing the corona as it is, not as it might just appear for the short time it is visible.

**The Sun in Literature.** Literature of all ages contains strongly-phrased reference to the sun and sun worship, though poets have sung more of the moon than of the sun. Among all savage nations the sun has always been regarded as a god and worshiped with great ceremony. In the Teutonic language the sun is feminine, being spoken of as *she,* while the moon is *he.* The Bible contains many allusions to the sun; Joshua commanded the sun to stand still and the moon to stay its course (*Joshua* X, 12). Some of the kings of Judah and Israel favored the worship of the sun, as practiced by the heathen dwelling round about them (*II Kings* 23, 5 and 19). Sun worship is still adhered to in India and China and has only recently been abolished among the Indians of North America.

In the famous *Bedouin Love Song* by Bayard Taylor the following lines occur:

Till the sun grows cold
And the stars are old.

Byron thus addresses the sun in virile figure of speech:

Thou material God!
And representative of the Unknown
Who chose thee for his shadow. Thou chief star!

An expression that has become a classic of brevity throughout the world is the practical philosophy of Cervantes, author of *Don Quixote,* who advises in homely figure to "make hay while the sun shines." F.ST.A.

Consult Giberne's *Sun, Moon and Stars;* Lockyer's *The Sun's Place in Nature;* Abbot's *The Sun.*

**Related Subjects.** The following articles in these volumes will give further information on the subject of the sun:

| | |
|---|---|
| Astronomy | Precession of the Equinoxes |
| Corona | Satellite |
| Earth | Solar System |
| Eclipse | Solstice |
| Ecliptic | Star |
| Equinox | Sun Dance |
| Gravitation | Sundial |
| Nebular Hypothesis | Sunstroke |
| Planet | |

**SUN'BIRD,** a tiny, tropical bird of Asia and Africa, with handsome plumage and long, curved bill. It keeps strictly to trees, where it seeks out larvae, spiders and insects for food. It builds an exquisite, pear-shaped or oval nest which it attaches to the end of a branch or the under part of a large leaf, often roofing over the entrance to keep out the wet. The eggs are two in number, whitish in color, with a profusion of streaks and spots. In habits and appearance the sunbird resembles the humming bird.

**SUNBURY,** *sun'ber i,* PA., the county seat of Northumberland County, is a borough east of the center of the state, fifty-four miles north of Harrisburg, the state capital. It is on the Susquehanna River and has transportation over the Pennsylvania and the Philadelphia & Reading railroads and electric interurban lines. Lumbering and coal mining are the supporting industries of the surrounding section, and the city has railroad shops, silk and woolen mills, dye works, planing mills and flour mills. It is the leading commercial center of the vicinity. Sunbury was founded in 1772 near Fort Augusta, which had been built in 1756 on the site of the Indian village of Shamokin. It was first incorporated as a borough in 1797. The Mary M. Packer Hospital, the courthouse and the municipal buildings are prominent features. In 1910 the population was 13,770; it was 16,260 in

1916 (Federal estimate). The area is about two square miles.

**SUN'DA ISLANDS,** two groups of islands in the Malay Archipelago, extending from the Malay Peninsula to the Moluccas. The Great Sunda Islands consist of Sumatra, Java, Borneo, Celebes, Banka and Belliton; the Little Sunda Islands being Bali, Lombok, Sumbawa, Flores, Sumba and Timor. With the exception of part of Borneo, they are under Dutch rule. The Sunda Strait separates Java and Sumatra, both of which suffered terrible effects from the eruption of Krakatoa in 1883. The Sunda Islands are extremely productive and carry on a large commerce in spices, fruits, copra, rice, coffee, cocoa, tobacco and sugar.

**SUN DANCE,** a religious ceremony once practiced by the Plains Indian tribes of North America, but now almost unknown. In most places it has been suppressed by the United States government, because of the fearful tortures that sometimes accompanied it. The ceremony was held once a year in summer or early autumn, and usually lasted eight days, the first three or four being devoted to preliminary rites. Each tribe had its special reason for organizing the dance, but it was always believed to benefit the tribe. Sometimes it was held in fulfilment of a vow made to the sun god. The members of the tribe would arrange their tepees around a central medicine lodge, with an opening toward the rising sun. In the center of the lodge was a pole, toward which the participants, who were stripped and painted, danced. The rites accompanying the ceremony were often very elaborate, and in all cases they had a special meaning.

**SUN'DAY,** among Christian nations the first day of the week, the day set apart for rest and public worship of the Deity. Among the old Teutonic peoples it was originally sacred to the sun, and its name has remained unchanged. Among the Latin nations, however, it became known as the Lord's Day, *dies dominicus,* from which the modern names *dimanche* (French), *domingo* (Italian), *domenica* (Spanish), etc., are derived.

In the earliest days of the Christian Era, the status of the Christians was such that they had to work every day in the week, and there is no evidence that Sunday was at first regarded as a day of general rest. It was, however, set apart for worship. About the middle of the second century the Church fathers began to discuss the question of forbidding work on Sunday, but it was not until the fourth century that Church and State officially recognized the day as a day of rest. Most of the states of the United States, the provinces of Canada, and Christian nations in all parts of the world now have laws regulating or prohibiting Sunday labor.

**SUNDAY,** William Ashley (1863- ), an evangelist and former baseball player who is known throughout the United States as "Billy" Sunday. He was born in Ames, Iowa. His father was killed in the War of Secession before William was born, and a part of his childhood was spent in a soldiers' home in Iowa. He went to high school and to Northwestern University for a time, but he never completed his college course. From 1883 until 1890 he played baseball on the Chicago, Pittsburgh and Philadelphia teams of the National League. He was a first-class player, one of the best in the United States in his time, and twenty-four years after leaving the diamond, at the end of an eleven-weeks' religious campaign in Philadelphia, he could still bat a "homer" and run the bases in sixteen seconds.

After his conversion Sunday served as assistant secretary of the Y. M. C. A. in Chicago (1891-1895). In 1903 he was ordained a Presbyterian minister, but he had begun his evangelistic work in 1896. He preaches the gospel of clean living, and has won followers by the thousands. Billy Sunday's amazing success is difficult to explain, but his methods are easy to criticize. His enemies are many; his language has been called "billingsgate;" his religious meetings have been termed "vaudeville stunts." But this is unfair. For, although his speech is slangy and crude, it is not vulgar, and there is something so vital, so human, so genuine about the man that people are irresistibly drawn to him. The religion he preaches is the sort that would appeal to the average American, for it is the simple doctrine of contentment, of living honestly, paying one's debts, of being faithful to home and family and of standing for community brotherhood and the common good.

**SUNDAY SCHOOLS,** or **BIBLE SCHOOLS.** When the international convention of Sunday Schools met at Zurich, Switzerland, in 1913, statistics for the world were compiled. It was found that there were at that time over 310,057 Sunday Schools in operation in Europe, Asia, Africa, the Americas and Oceania, and that they had a combined enrolment of over 27,000,000 pupils. (These figures do not include the 2,850,000 in Roman Catholic schools.) The

numbers given above tell a story of a wonderful development, for the Sunday School as we know it to-day is the outgrowth of a movement that began late in the eighteenth century, and is hardly older than the American republic.

It was a movement inaugurated by a benevolent publisher of Gloucester, England, named Robert Raikes (which see). Moved by the forlorn condition of the children of the poor in his town, he conceived the idea of gathering them together on Sundays and hiring women to teach them. His first so-called "Ragged School" was started in 1780. The interest shown by the children and the good accomplished more than justified the experiment, and when such workers as John Wesley and George Whitefield, and even the queen herself, gave their support to the work, the movement spread rapidly. When Raikes died, in 1811, there were about 400,000 children in Sunday Schools.

In America the Methodists began the organization of Sunday Schools on a definite plan soon after the conclusion of the Revolutionary War, and other denominations followed their example. In 1824 a voluntary union of Christian workers of different denominations was organized in Philadelphia under the name of the American Sunday School Union. Through missionary workers sent to all parts of the United States this organization has established thousands of schools, especially in rural communities, and has circulated millions of dollars' worth of Bibles, Testaments and other religious publications. An average of about four new Sunday Schools a year has been maintained by the organization since its foundation. In many cases the schools have become organized churches.

In the year 1872 American Sunday Schools of all denominations began using a uniform system of lessons, designed to complete the study of the Bible in six years. This movement became international in 1875, and in 1889 it became world-wide. The organization which publishes the lessons is known as the International Sunday School Association. In recent years the need of a graded system of lessons has been felt, and in many Sunday Schools this idea has been successfully carried out. A well-organized school is divided into different departments, each having its own superintendent. The pupils are arranged into classes according to age and mental capacities, much as in the secular schools, and each department has a course of lessons especially adapted to the pupils of that division. Other features of modern Sunday School work are classes for teachers, Sunday School workers' institutes, conventions and circulating libraries.

Religious instruction in the Roman Catholic Church is given to all children who attend the parochial schools, and those who do not attend them are required to attend Sunday classes held in the schools. A.C.

Consult Lawrence's *How to Conduct a Sunday-School;* Pattee's *Elements of Religious Pedagogy;* Brown's *Sunday School Entertainments.*

**SUN'DERLAND,** a seaport and coaling station of England, in Durham County, situated on the northeastern coast at the mouth of the Wear River, about fourteen miles northeast of the city of Durham and 261 miles northwest of London. Sunderland is one of the most important shipbuilding centers in the kingdom, and one of the world's great coal-shipping ports, and it has a fine harbor defended by batteries. One of the coal mines in the vicinity, the Pemberton, is 2,286 feet deep, and is reputed to be the deepest known. Among the interesting features of the town is Saint Peter's Church, which retains portions of an old seventh-century monastery, in which the Venerable Bede was a student. The industrial establishments include marine engine works, glass and pottery works and cable and rope factories. Fishing is an important occupation of many of the inhabitants. Population in 1911, 151,159.

**SUNDEW,** *sun'du,* a group of interesting plants found in bogs and marshes, so called because they secrete drops of sticky fluid which glitter like dew in the sunlight. The sundews belong to that class of plants which entrap and devour insects (see CARNIVOROUS PLANTS). A common American species is the *round-leaved sundew,* the leaves of which spring from the root. They are borne at the ends of slender leafstalks which radiate from the root like spokes from the hub of a wheel. The leaves are covered with stiff, short hairs, each of which ends in a knob covered with a sticky liquid. When an insect lights on one of these knobs it is liable to be held there, and then the hairs close over it and imprison it. After the captive dies its soft parts are absorbed by the leaf, which pours out a juice that digests them. The plant has a tall, slender flower stalk, on which the small, white flowers are borne in rows.

**SUNDIAL,** the oldest known device for measuring time. The earliest mention of it is in the Bible (*Isaiah* XXXVIII, 8):

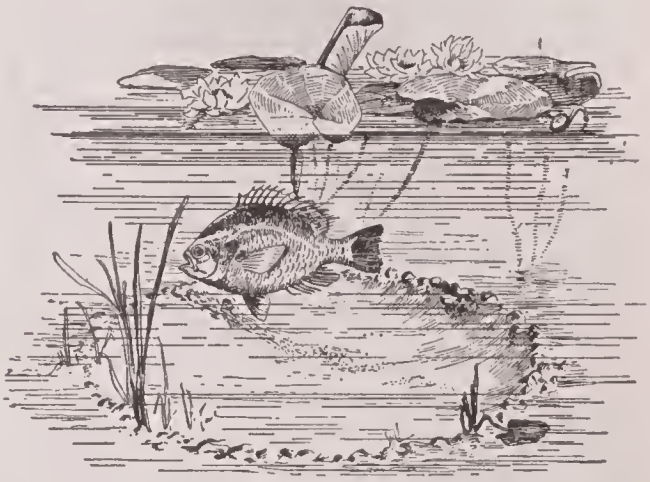
> Behold, I will bring again the shadow of the degrees, which is gone down in the sundial of Ahaz, ten degrees backward.

The probable date of the sundial above referred to is about 700 B.C. The earliest sundial of whose construction there is certain knowledge is the dial of Berossus, a Chaldean astronomer who lived about 300 B.C. This dial was a hollow hemisphere, set with its rim horizontal and with a small bead fixed at the center. The shadow of the bead, during the sun's progress from east to west, described a circular arc. This arc was divided into twelve equal parts. The dial, as a consequence, divided the day, from sunrise to sunset, into twelve equal parts, which were called temporary hours. The length of these hours necessarily varied with the seasons.

For sixteen hundred years sundials, though built in various ways, were all based on the principle of temporary hours. About the year 1400 the introduction of clocks and other mechanical devices for measuring time made necessary the determination of *equal hours*. Just when the transition took place is uncertain, but by the end of the sixteenth century the temporary hours seem to have gone out of use. By the end of the eighteenth century the use of sundials was practically discontinued, except where they served as ornaments or were preserved as relics.

A dial is composed of two parts, the *dial face* or *plane,* and the *stile* or *gnomon.* The dial face is divided into quarters, and the dial must be set so that the dividing lines run toward the four points of the compass. The dial is further marked into hour spaces, with divisions of halves and quarters. The gnomon is a flat piece of metal, set in the center of the dial and pointing toward the North Pole. On sundials used in the southern hemisphere the gnomon must point to the South Pole. Sundials are known as horizontal, vertical or equinoctial, according as their planes are respectively in the same plane as the horizon, in a line perpendicular to that plane, or parallel to the equator. W.F.Z.

**SUN'FISH.** There are several kinds of fish to which this name is applied. In North America the sunfish are a group of small, bright-colored food fish, rarely over ten inches long. An interesting fact in regard to their coloration is that it changes according to conditions of health, food and temperature. The common sunfish, or sunny, is found abundantly in brooks and ponds from Maine to Florida and in the northern part of the Mississippi Valley. It has a roundish body and there is considerable orange in its coloration, so that the name given it by young anglers—"pumpkin seed"—is very appropriate. This fish is about eight inches long and weighs from six to eight ounces. Boys enjoy angling for it because it bites with so much vim. Other well-known sunfish are



THE SUNFISH
The male is guarding the typical circular nest.

the *blue spotted,* the *mud,* the *long-eared* and the *copper-nosed.*

The name sunfish is also given to a group of grotesque-appearing ocean fish which have the habit of resting on the surface in sunny weather with one fin above the water. The body is scaleless, dull colored and clumsy, that of one species seeming to consist of one great head with small fins. The young, however, look more like typical fish. Ocean sunfish are never used as food.

**SUNFLOWER,** *sun' flou er,* a flowering plant of the Composite family, so named because of the great flower head with its encircling rays of gorgeous, yellow petals. James Montgomery's poem to the flower contains these lines:

* * * the sunflower turns on her god, when he sets,
The same look which she turned when he rose.
—MOORE: *Believe Me, If All Those Endearing Young Charms.*

Eagle of flowers! I see thee stand,
And on the sun's noon-glory gaze;
With eye like his, thy lids expand,
And fringe their disk with golden rays.

One of the best known of several species is the annual garden sunflower, which under cul-

tivation bears flower heads a foot in diameter. These heads are flattened disks, surrounded by circles of florets. The outer circle in each case is a row of large, yellow petals which seem always to be turned toward the sun, and from it to draw their bright color. The other florets, which form row after row of concentric circles, are small, tubular flowers. The plant has a rough, hairy stem from six to ten feet high, and coarse, heart-shaped leaves. Numerous leaflike bracts surround the disk, their purpose being to protect the more delicate parts of the flower. The sunflower is cultivated for decorative purposes, and for its seeds, which are used as food for cattle and poultry. In some sections of Europe the stalks are used as fuel and the seeds are eaten as nuts.

**SUN'STROKE.** This term has been applied to two different ailments resulting from overheating of the body. As the remedies for these ailments are entirely different, they should be very carefully distinguished. The more serious condition is known also as *heat stroke* and *heat fever*. It usually comes on quickly. The victim has a sense of burning heat all over the body; he becomes dizzy, cannot see clearly, and grows nauseated and faint; then he falls unconscious. The skin becomes burning hot and red and there may be delirium, vomiting and diarrhoea. The temperature will rise to 108° or more, in some cases as high as 115°. Such strokes may attack persons who have not been in the sun at all, but who are shut in hot rooms where the air has become foul.

The first thing to be done with a victim of sunstroke is to cool the body, by putting the subject in a cold bath or wrapping him in cold, wet sheets. As soon as the patient regains consciousness the cold applications may be discontinued unless the skin becomes hot again. Water may be given, but under no circumstances should any stimulant be administered, as stimulants warm the body. It is always wise to call a physician, but if one cannot be found no time should be lost in getting the victim cooled. Should a boy on a fishing expedition in the woods suffer from heat stroke his companions should roll him in the river without delay.

**Heat Exhaustion.** This is the term which is applied to the milder ailment. In this case the pulse becomes feeble, and the patient feels exhausted and is faint, but is not necessarily prostrated. The skin, instead of becoming burning red, is white and clammy. If the attack is severe the subject will lose consciousness, and the temperature will fall below normal, perhaps to 95°. Recovery, however, is usually a matter of a short time, the chief remedies being rest and stimulation. Cold is never applied externally, except that a cold cloth may be placed on the head. Tea, coffee or aromatic spirits of ammonia should be administered, or if nothing else is at hand a small quantity of whisky or brandy in a large quantity of water. If the case is unusually bad a warm bath may be given.

Deaths from sunstroke are numerous in large cities during very hot spells, but many fatalities would be prevented if people would be more careful about eating and drinking. Excesses of any kind should be avoided, but especially indulgence in alcoholic liquors. See ALCOHOLIC DRINKS, subhead *Cause of Heat Prostrations.* C.B.B.

**SUPERIOR,** *soo pe'ri or,* LAKE, the largest body of fresh water in the world, and the deepest, most elevated and most northwesterly of the five Great Lakes of North America. It lies between Ontario on the north and east,

LAKE SUPERIOR

The small corner map shows the location of Superior with respect to the members of the group of Great Lakes.

Wisconsin and Michigan on the south, and Minnesota on the west. Its maximum length from east to west is 412 miles, and its greatest width is 167 miles; the area, 31,200 square miles, is a little greater than that of the state of South Carolina. Lake Superior has a maximum depth of 1,008 feet and is 602 feet above sea level. About two hundred rivers pour their waters into it, the largest of which, the Saint Louis, at the western end, is the most remote headstream of the Saint Lawrence. Isle Royale (which see), about eight miles from the international boundary between the United States and Canada, is the largest of its islands; others of importance are Saint Ignace, Grand, Manitou and the Apostle group.

Lake Superior has for the most part a bold and rocky coast line. In some places, especially on the north shore, there are steep cliffs

rising abruptly from the water's edge to heights of several hundred feet; the Michigan shore is diversified by the famous sandstone walls known as the Pictured Rocks. The lake basin is a huge rift in a region rich in copper, iron, nickel and other ores. The waters of the lake are unusually pure, and they abound in whitefish, sturgeon and trout. Because of its depth the lake never freezes over, though ice forms along its border and in the bays.

This fresh-water lake is an important link in the greatest water highway of North America. It discharges at the eastern end into Lake Huron by way of the Saint Mary's River. There is a difference of over twenty feet in the levels of the two lakes, and at the drop from Lake Superior to the river, where there is an impassable series of rapids, there have been built the famous locks of the Sault Sainte Marie Canal. One may travel by water from Duluth, at the western end of Lake Superior, to the Atlantic Ocean. The chief cities on the lake are Duluth and Superior, Minn.; Marquette, Mich.; Ashland, Wis., and Fort William and Port Arthur, Canada. See GREAT LAKES; SAULT SAINTE MARIE CANALS.

Consult Agassiz's *Lake Superior: Its Physical Character, Vegetation and Animals.*

**SUPERIOR,** WIS., a port of entry and the county seat of Douglas County, is situated in the extreme northwest corner of the state, 150 miles north and east of Saint Paul. Superior and Duluth, separated only by the Saint Louis River, are the most southwesterly ports on Lake Superior, and together form one of the greatest inland shipping points in the United States. Superior has enormous facilities for water commerce, and its railroads are the Chicago, Milwaukee & Saint Paul; the Duluth, South Shore & Atlantic; the Great Northern; the Minneapolis, Saint Paul & Sault Ste. Marie and the Northern Pacific. The population, which includes a large percentage of Scandinavians and Irish, was 40,384 in 1910, and 46,226 in 1916 (Federal estimate). The area exceeds thirty-six square miles.

Superior is the seat of one of the state normal schools. Other prominent features are the Federal building, completed in 1908 at a cost of $325,000, the Carnegie Library and several hospitals. One of the chief points of interest is the deep, protected harbor, which has been improved by government, state and city appropriations and supplied with some of the largest coal and ore docks and grain elevators in the world. A great steel bridge crosses the river to Duluth. Superior has furniture factories, foundries and machine shops, ironworks and shipbuilding yards. Ample power for manufacture is supplied by a power plant in the river.

It is probable that the site of Superior was visited by Radisson and Grosseilliers in 1661. A trading post was established here by Sieur Du Lhut in 1680, but no permanent settlement was made until about the middle of the nineteenth century. The town was organized in 1855, and its development was promoted by several capitalists and congressmen, among whom was Stephen A. Douglas. Superior became a city in 1889. H.M.C.

**SU'PERNAT'URAL.** See OCCULT.

**SU'PERNAT'URALISM,** the belief that there is an agency above the natural in religion. It is based on man's instinct to look to a power higher than himself for care and direction, an expression of which is found, for example, in the words of the Greek poet, Homer:

> As young birds ope the mouth for food,
> So all men need the gods.

An example of modern supernaturalism is the acceptance of the revelation and miracles of the Bible. It is opposed by *rationalism,* which formulates its beliefs entirely by the exercise of reason.

**SUPERSTITION,** *su per stish' un.* Superstition represents a phase in the history of thinking. The most difficult art that man has had to learn is the art of reasoning. He has learned it very slowly, very imperfectly. Primitive habits of thought, childlike inclinations to believe, yet persist; such tendencies are responsible for the continuance of superstition. The contrast to and the remedy for superstitious thinking is scientific thinking. In these days of general education, every one knows a considerable mass of facts and of the relations of cause and effect, which science has established by observation, proof and insight into principles or laws of nature. Every one's mind has been drilled and formed by some measure of scientific thinking. But outside this limited range—and even within it—all sorts of notions are held which are more closely related to superstition than to science.

Among the relatively uneducated masses, the tendency to cling to the earlier, simpler habits of belief is strong; it was far stronger when education was confined to the elect, and even they were imperfectly freed from unscientific notions and practices. Because science has illuminated so fully the facts of physics and chemistry, of

biology, physiology and the rest, and initiated men into the scientific point of view, the outgrown beliefs and systems of past ages seem strange, and the practices curious and absurd. But in milder form, in less serious directions, we may sympathize with the feelings that led to such beliefs and practices. Superstitions reflect an attitude of mind, a way of thinking about the happenings and relations of the world; that mental habit—pernicious at worst, uncritical at the best—plays an important part in the regulations of human conduct.

**The Strange and Unknown.** A reason or explanation satisfies curiosity, but its more practical end is to guide conduct. The strange, the unknown, induces fear and uneasiness. Understanding makes for mental adjustment. As events are understood, man becomes at home in the world of happenings; he anticipates, prepares and in some measure controls his fate. But his questionings go beyond this immediate purpose; his curiosity is always asking: Why? The history of early science and of superstition shows what kinds of answers were satisfactory in the childhood of the race.

**Foretelling the Future.** The most general interest of inquiry is to read the signs of events and foretell the future. Such foresight or insight was regarded in primitive communities as a gift, a privilege of the elect; the predecessor of the man of learning was the priest, medicine-man, soothsayer, and wonder-worker. He professed to know the ways of nature and the mystic forces that control destiny, including especially the spirit forces which all primitive religions recognize. In more established societies, he may be, like Joseph, an interpreter of dreams; for dreams come from the unseen world and bear upon the personal fate of the dreamer. The Romans had professional augurs; by the flight of birds, or by the appearance of the entrails of sacrificed animals, by omens of sky and everyday incidents, they decided when the signs were favorable for battle, for alliances, expeditions, or the personal fortune of king or leader. The Delphic oracle, the Cumaean sibyl, illustrate the religious aspect to this function; for science and religion develop together, as in primitive societies the priest, the wise man, the diviner or sorcerer are one. Through him as a medium, the gods are implored to prevent storms or plagues, to bring good crops and successful enterprises. There may be an alliance with evil spirits as well as good ones; the sorcerer's power may be feared as well as respected. He has to do with the reading of omens, the telling of fortunes, the preparation of charms, the cure of disease, and the protection against enemies. The world in which he exercises his art is dominated more by fears than by hopes, for unseen dangers and evil spirits are constantly threatening. The reading of signs and control of fate by charms and countercharms most amply illustrate the setting in which superstitions flourish. The tendency to believe and be influenced by such practices is the superstitious bent. In surveying the varieties of superstition, we may observe the *motives* that prompt belief—always some strong desire or fear; the *means,* that is, the practice followed, usually in relation to a set of principles or a system of interpretation; and the *basis* in observation of reasoning that supports it. Thus viewed, superstitions, though fanciful, cease to be arbitrary, and often acquire an interesting history; they become specimens in the museum of thinking.

**Ascribing Motives to Nature.** Underlying the notion that gave rise to the practices of divination and magic is the belief that events occur for their personal significance. The outer world and its happenings are interpreted in human terms. Nature is supposed to act with motives similar to human motives. A storm is thus regarded as the revenge of an offended god; a plague is a dire punishment for transgression of some sort; success will be the reward of generous sacrifices, and good luck of observance of minute prescriptions. Still more generally is the setting of nature interpreted as bearing upon personal ventures and fortune. In this type of reaction to their environment, men found the sky the most impressive object of contemplation; it becomes the symbol of the great beyond and the dwelling place of the mighty powers that control. It invites worship and awe. The sun, moon and stars with their regular, yet mysterious, changes; clouds, rain, wind, lightning, thunder; night and day, seasons, weather—these condition human enterprises. Out of this close relation arose the oldest of the sciences (astronomy) and the most widespread of superstitions. It should be proper to speak of all such notions as *astrological,* though astrology refers usually to the system in its elaborate form, as practiced from ancient times to within a few centuries. The notion that the stars are connected with human destiny is the underlying one. The heavenly light of a star in legend is associated with the birth of Confucius, as well as of Moses and of Jesus, with the birth of the Caesars of Rome or the

mighty of the earth; Napoleon seems to have had a sincere belief in his star of destiny. No less astrological is the belief that when momentous human events are to occur, portents are seen in the sky as on earth; when Rome was threatened the earth trembled, volcanoes broke forth, lightning bolts flashed, the heavens were obscured. In some minds a comet still strikes dismay as a sign that the end of the earth is approaching.

**The Horoscope.** Astrology shows the close relation of science and superstition. Important facts relating to the sun and moon, the stars and planets, were gathered under the motive of studying the celestial influences upon human life. Only three hundred years ago, Kepler, the most scientific astronomer of his day, practiced astrology. Though he spoke of astrology as the foolish daughter of a wise mother (astronomy), he had a measure of faith in the horoscopes which he cast and by which he earned his living. Astrology is a system of divination (which see), requiring astronomical data; the horoscope which predicts the fortune of the individual by reference to the position of the heavens at the time of birth is the most elaborate product of superstition that the human mind has devised.

It is not easy for our minds to follow or state its basis. We can understand the exercise of the imagination by which the planets, stars and constellations received names; these names were those of the gods of mythology, who in turn were accredited with certain powers and attributes. Again, some of the constellations were named in fancied resemblance of their outlines to the shapes of animals, and these animals, too, have qualities. Also, the movements of the heavenly bodies bring about changes of position—rising and setting, opposition and conjunction. Out of this elaborate set of relations a zodiac is formed and prediction begins. Mars is the name of a planet and of the god of war; Venus is the name of another and of the goddess of love. Jupiter has one disposition, and Saturn another. Consequently (?) a child born under the ascendancy of Mars will be violent and pugnacious; one under the dominance of Venus will be given to ardent love affairs; those at whose hour of birth Jupiter presided will be jovial (for *jovial,* derived from Jove-Jupiter—is an astrological word); and those with like relation to Saturn will be saturnine, or morose and gloomy in disposition. "A child born under the sign of the *lion* will be courageous, but one under the *crab* will not go forward in life; one born under the *waterman* (aquarius) will be drowned" and so on; and this merely because the arrangement of certain stars suggested the shape of a lion, and the lion is a bold, courageous beast; another the shape of a crab, which has the habit of walking backward; a third that of a water carrier, and in water one may drown. No other attempt—at least none with so ancient and influential a history—to bring together in the way of cause and effect the most remote happenings and relations, is quite so far-fetched and extravagant. But that kind of reasoning underlies many systematized superstitions and loose beliefs. Such argument is called an analogy, in this instance a most feeble, remote and fanciful one. Pretentious systems like astrology may be called pseudo-sciences, because they attempt to build up a body of doctrine after the manner of a science, upon a basis that is entirely, or largely, akin to superstition.

**Everyday Superstitions—Survivals of Astrology.** Survivals of astrological notions appear in such practices as planting potatoes or cutting hair when the moon is waxing; the analogy being that as the moon grows, so will the potatoes or the hair. Conversely, alders and undergrowth and anything that one wishes to be rid of, should be cut when the moon is on the wane, so that as the moon disappears, so will they. The pathetic incident of Barkis going out with the tide reflects a like notion of sympathy between human life and the movements of nature. This manner of connection or sympathy or analogy—or however we describe the slight, fanciful, remote bond—extends to many details. Religious processions must follow the direction of the sun (from east to west), and never the reverse. In stirring batter for bread, or in churning butter, the motion must be sunwise. Reversing the direction will spoil the result or invite bad luck. Such reversal is itself an apt instance of analogy as it prevails in superstitious thinking. A reversal of a normal direction becomes unholy or unlucky. Since right-handedness is the normal relation, something of the weird or prohibited attaches to the left. *Sinister* means literally left, but has the secondary meaning of suspicious or of bad omen. A reference to the left shoulder reverses the meaning, or averts the consequences of a falsehood; or by the value attaching to the unusual, the left hind foot of a rabbit becomes a charm, or one must see the new moon over the *left* shoulder, and with sil-

ver in one's pocket to insure good luck. Superstition tends to become ever more detailed and determined. Every minute practice and circumstance carries some slight measure of good or ill luck. The choice of food, of dress, the conduct of the chase, of war, of sowing and reaping are all regulated minutely; for superstition invests trivial circumstances with significance and weaves a close web of regulation—of what to do and what not to do—that hampers action and fetters the mind. Science liberates while superstition enslaves.

The notion of sympathy or, in another form, correspondence, is prominent in magic; it is recognized as sympathetic magic. The common form of the practice is for working ill, casting a spell or bewitching. Some primitive people hardly attain to the notion of a natural death; death is either the obvious consequence of a violent injury, or to be accounted for as an obscure, magical influence. The sorcerer *wishing* the death of a victim makes a crude image of the person, or obtains a lock of his hair, the parings of his finger nails, an article of clothing, or dedicates some object to represent the victim; he then sticks thorns into the image, burns it, buries it, tortures it, pronounces incantations upon it, and all these evils will happen to the enemy. In a trial for witchcraft in 1618 two women were executed at Lincoln for burying the glove of Henry Lord Rosse so that "as that glove did rot and waste, so did the liver of said lord rot and waste." Such is sympathetic magic.

**Protection by Charms.** The two notions that disaster may be transferred by wishing evil, and that some persons have peculiar magical powers, unite in the belief in the "evil eye," which is widespread in the Orient and from there invaded Italy. By some peculiarity of appearance or manner, certain persons of low or high degree get the reputation of possessing the evil eye. Hence all sorts of countercharms are devised to offset the deadly glance. (It is interesting to note that we still call any trinket such as is carried on a watch chain a *charm,* but accept it merely as an ornament; yet these sometimes carry a device suggestive of the old meaning.) The charm may be in the form of a prayer written on paper, or a formula, or a metal or stone; the bits of mirror worked into Oriental embroideries carry the tradition of being such countercharms.

Any holy object or relic may be used as a charm, as by like power it may cure disease. Some are protections against definite ills such as shipwreck (this is true of some of the tattoo marks of sailors), or smallpox, or violent death. Others indicate a protection against the entry of evil spirits. The horseshoe nailed over the door is a familiar example. It survives as a general symbol of good luck, but carries mainly the notion of protection to a house. About it are gathered minute ceremonies. In the Spreewald (Germany) the finder of a horseshoe must at once return to his house without speaking to anyone (for speaking breaks the charm; similarly, when children *wish* on the first star that appears at evening, they wait to be spoken to before speaking); he must hang it over the door with the prongs up (for if hung the other way, the luck will fall out); it must be nailed with three nails and three blows of the hammer (mystic power of *three,* probably derived from the Trinity). (If a maiden finds a horseshoe and it has nails in it, the number of the nails indicate the number of years before she will be married; another example of the doctrine of signs.)

The origin of the horseshoe tradition is not clear. It belongs to modern rather than to the most ancient folklore. The virtue may lie in the shape, in the metal, in the association with the horse. The fact that we cannot readily determine the basis of its choice shows how far we have grown away from the type of thinking that gave it peculiar power. It is also a good example of the type of logic that is sufficient to establish a belief. There is no proof of relation between a horseshoe and good fortune. Favorable cases are noted and unfavorable ones neglected or explained away as due to lack of proper ceremonies or the bad character of the concerned.

A word should be said concerning the use of names as charms, and the importance of formula in incantations. The primitive idea regards the name and the person as closely connected; true names may be concealed lest by their use one may be bewitched. Holy names must not be spoken. The custom of "taboo" thus arises. But as in the tales of *Arabian Nights* the magic word brings the genii or opens the mystic door, so in the administering of drugs, or the performing of rites to bring luck mystic words are used; without the right words, the charm fails. Words are also countercharms, and if spoken at the proper moments ward off evil. The notion is preserved in the common superstition of touching wood to prevent the happening of trouble that is mentioned. (The wood is by some referred to

the symbol of the cross.) A traveler mentions that he was never in a railway accident, or a mother mentions that her children never had whooping cough; and at once touches or knocks on wood to prevent the mere mention of the misfortune from bringing it on. The Germans under the same circumstance say "Unberufen," similarly to prevent the mere name or mention from bringing on the reality. The magic of names has a large history in which remote notions of such connection are embodied. (See MAGIC.)

**The Folklore of Salt.** It is difficult to say why one article rather than another becomes the center of folklore superstition. The folklore of salt is a typical instance. It, too, is supposed to keep off spirits; and throwing a pinch of salt over the left shoulder is a ceremony that in some countries is a means of keeping the devil at a distance. The spilling of salt as a bad omen is widely current; it is commonly interpreted as the sign of a quarrel, possibly because the acceptance of salt indicated friendly hospitality. An example of sympathetic magic with salt is the following from the South of England. A maiden on three successive Friday nights throws a pinch of salt into the fire and says:

> "It is not this salt I wish to burn,
> It is my lover's heart to turn;
> That he may neither rest nor happy be,
> Until he comes and speaks to me."

On the third night she expects to see her lover. Note the number *three,* and the day Friday, commonly an unlucky day, but here chosen as propitious for magic. Superstitions cumulate, old and new notions mingle, but all in the same vein. A Swiss peasant may be advised to fortify himself against evil spirits by carrying a piece of fresh bread in one coat pocket and a psalm book in the other; a piece of rock salt in each vest pocket or inside a briarwood cane upon which three crosses have been cut. A negress may carry a rosary and a rabbit's foot in the same pocket for a double protection.

**Driving Evil Spirits Out of the Body.** The practice of medicine offers a favorable field for tracing the course of superstition. The early and widespread notion that disease is caused by the invasion of a foreign spirit comes from the days when priest and physician were one. Cure takes the form of exorcism. By weird ceremonies the *shaman* or priestly medicine-man attempts to drive or suck or frighten the spirit out of the afflicted body. The drum and the rattle, as well as a bag of herbs or magic odds and ends, are his insignia; the drum and the rattle are now the playthings of children. This notion is part of the more general one of the direct play of spirits (animism) in the forces of nature and the conditions of life. A dream is regarded as a real experience in which the soul of the sleeper takes an excursion to another world and brings back reports. Hence the practice of never awakening a sleeper, lest his soul fail to find its way back to the body. A like belief leads to the "ghost" or returning spirit—which plays a large part in superstition, and prepares the ground for such modern movements as Spiritualism (which see)—to ancestor worship, or to the return of ancestors in the newborn child.

It may be interesting to trace some of the remote superstitious forms of such belief. Sneezing has always been regarded as an omen, in some cases as of supernatural origin. There is the feeble notion that a spirit is leaving the body in the sneeze; to turn it to good omen the Italians say "felicita" and the Germans "gesundheit," thus wishing happiness and health. The spirit notion in seeking some visible expression has become attached to the image, or reflection which equally is involved in the personality. Hence the practice of covering mirrors at times of death or other occasions, of attaching a peculiarly bad omen to the breaking of a mirror; or again the objection of North American Indians as of other people to have their portraits or their photographs taken. This may be partly because the picture might be used for bewitchment, but is also because the sitter is parting with a portion of himself. The custom of naming children for ancestors is at once an intelligible sentiment and has a dim reference to an actual return; among some primitive people the name is given according to the returned ancestor thus recognized. Oriental people will not name a child for a living relative. In such remote practices or prejudices we may recognize the vestiges of ways of thinking that once determined the serious views of life.

Exorcism was practiced until within recent times. It was taken up by the Christian Church and there used both to cure disease, to rid haunted houses of their ghostly visitors, even against the damages caused by raids of animals, vermin, or plagues. In connection with the belief in the divine right of kings, the king's touch had peculiar power to cure scrofula. Particularly when the patient acted strangely, lost

consciousness, foamed at the mouth, or raved in delirium, was the explanation of possession by a spirit resorted to. The term *epilepsy* means seizure and refers to the possession by a spirit. (See WITCHCRAFT.) The astrological notions invaded medicine and led to the belief in the moon as a cause of insanity, in deference to which notion we still use the word lunacy (from *luna,* the moon), and the belief prevails that sleeping in the moonlight is peculiarly dangerous. It is another phase of this belief that associated certain days with the medical practices. An ancient manuscript mentions twenty-eight days "which were revealed by the Angel Gabriel to good Joseph, which ever have been remarked to be very fortunate days either to let blood, cure wounds, use merchandises, sow seed, build houses, or take journeys." (These good and bad days are really of Egyptian origin.) So medicines had to be taken at prescribed times and ceremonies. In such practice there is much room for the operation of a mental attitude. The patient was impressed by the weird and minute prescriptions, and his confidence of benefit expected (see FAITH CURE) was doubtless more effective in many cases than the potion or operation. It was this confusion of scientific fact and superstitious belief that Voltaire satirized when he said that incantations, together with a sufficient amount of arsenic, would doubtless kill your neighbor's sheep.

To illustrate the mixture of science and superstition the following may be cited from a letter of an M. D. of date 1581: "On Friday and Saturday, the sign will be in the heart; Monday and Tuesday in the stomach; during which time it will be no good to take your ordinary physic." (The different parts of the body were associated with the signs of the zodiac, as may still be seen in the picture of the human body and the astrological signs in an old-fashioned almanac.) In an almanac of 1571 one may read: "No part of a man's body ought to be touched with the Chirurgicall instruments or cauterie actuall or potencial, when the Sunne or Moone or the Lord of the Ascendant is in the same signs that ruleth that part of the man's body."

**Medical Superstitions.** The principle of analogy is variously illustrated in medicine. On the side of cure it appears in the doctrine of signature, by which eyebright (the flower having the appearance of an eye) is prescribed for eye trouble; walnuts (the shell like the skull, the kernel like the brain) for diseases of the brain; or in the practice of Chinese physicians to administer the tops, middles, and roots of plants for diseases of the head, chest, and legs respectively. The doctrine of sympathy was systematized in that country in the remarkable idea of treating not the wound but the weapon that inflicted it; as the salve was applied to the weapon, the wound would heal. The phrase "to take a hair of the dog that bit you" reflects the similar notion that by means of the hair one may cure the bite. Direct transfer is practiced by literally wishing or by contact placing the diseases upon an animal or an object, and thus relieving the patient. Recent cases are reported in which children attacked by whooping cough were required to cough in the face of a live catfish kept in a tub for that purpose. Similarly by analogy the fact that a loadstone will draw to it particles of iron has led to the belief that it will also draw rheumatism out of the body. When the magnet was relatively unknown, it was accredited with mystic powers; and European peasants carried one to avert and cure disease. Yet the faith is no different from that which leads credulous people to-day to pay handsomely for "electric" belts and similar fraudulent devices. (For the part that the magnet has played in allied practices, see HYPNOTISM.)

An interesting medical superstition, likewise with an ancient history, is the notion that unusual and uncanny objects will have powerful medical effects. The most nauseous concoctions were brewed as medicines. This practice is well preserved in the formula of the witches' caldron in *Macbeth:* "eye of newt, toe of frog, lizard's leg, scale of dragon, gullet of a shark, a tiger's entrails, slips of yew gathered in the eclipse of the moon," "root of hemlock, digged in the dark," "liver of blaspheming Jew," "nose of a Turk, and Tartar's lips," "finger of birth-strangled babe:"

> "Cool it with a baboon's blood
> Then the charm is firm and good."

Medical potions and charms (love potions or love philtres particularly) were not clearly distinguished; and the drugs used often combined with incantations or superstitious directions were impressive because of the mystic setting in which they were prescribed.

**Present-day Superstitious Thought and Practice.** The wide range of superstitious thought and practice may be further illustrated by a survey of current practices, sometimes followed with full belief in their virtue, more commonly in a playful half-belief not unmixed

with a feeling that it is on the whole safer to conform. From 875 persons (eighty per cent women, twenty per cent men), of ages sixteen to twenty-eight (students in two normal schools of California), there were obtained about 1,100 admissions of full belief in some superstition, about twice as many admissions of half-belief, and nearly four times as many disbeliefs. There were nearly as many who believed as who disbelieved in some form of luck or sign.

Spilling salt is the sign of a quarrel; bubbles in the tea cup or an itching skin means visitors; a blister on the tongue means that you have told a lie; when four persons in shaking hands cross hands, it means a wedding; when your ears burn, someone is speaking of you; when you have the cold shivers, some one is walking on the spot that will be your grave; stepping on the cracks of paving-stones means that you will fail in your lessons; giving a knife cuts friendship; breaking a mirror, walking under a ladder, postponing a wedding, opening an umbrella indoors, turning back on a journey, stubbing the toe, wearing clothes inside out, wearing a peacock feather, meeting a funeral, going out of a house through a window, sitting on a table, are all signs of bad luck; finding four-leaved clovers or horseshoes, picking up pins, returning part of money in payment are signs of good luck. Add to these the avoidance of Friday for enterprises, the refusal to sit down thirteen at table, the belief in dreams, and one has a fair notion of the great body of traditional folklore which has come down the ages and obtains more or less of a hold upon the growing minds of even the educated classes; incidentally the attempt to see some kind of meaning or connection between sign and event requires an initiation into the byways of outgrown systems and the ways of primitive thinking.

As now current, these are fairly innocent superstitions, which but slightly interfere with the regulation of conduct by scientific thinking. That even slight belief affects conduct is shown by the fact that rooms in hotels, cabins in steamships, houses on streets skip number thirteen or substitute twelve and one-half; that until recently steamers did not set sail on Friday; that some business men avoid transactions when the thirteenth of the month falls on a Friday; or even that a Thirteen Club exists in New York, formed of thirteen members, meeting for dinner on the thirteenth of the month at 7:13 o'clock, in order to defy this superstition.

*Pseudo-Science—Mixture of Fact and Superstition.* The effect of the belief or entertainment is quite different when transferred to the systems of interpretation of the pseudo-scientific type. These, too, show the mixed origin and reflect the history of superstition. Most flagrant is the practice of fortune telling. It rests primarily upon the doctrine (or the pretense) of special powers, obtained by peculiarities of birth (the seventh son of a seventh son, born with a caul), or of association with a favored tribe (the gypsies), or occult learning (India), or of actual success in prediction, or possession of a system. Fortune telling by cards (see DIVINATION) shows how readily chance combinations may be fitted to the ordinary run of human fate. But palmistry is the most typical in that it reads personal fortune from personal features, not as physiognomy attempted to do by observing what kinds of qualities are associated with features, but superstitiously by attaching far-fetched consequences to minute variations in the creases of the palm. Physiognomy, like phrenology, is a pseudo-science because its data are utterly inadequate, unreliable, and misinterpret the relations which they observe.

These attempt to build up knowledge after the manner of a science, but really depend upon prepossession, loose reasoning, and a hopeless kind of evidence. They are superstitious only in that the underlying idea continues the search for *signs* of qualities of personal value in outer indications. Psychology as a science has shown how differently one must proceed to obtain such insight, and that any rough-and-ready diagnosis or reading of character, much less of fate or fortune, is essentially unscientific, as is the search for the elixir of life, the philosopher's stone, or the fountain of youth. The case of palmistry is much worse; it is plainly superstitious in spirit, in method and in the kind of interpretation which it employs. The creases of the hand are adapted to use and presumably had their origin in the apelike ancestors of the human race who dwelt in trees. To call one of the major creases "the line of life" and predict longevity or an early death from its variable length is an utterly arbitrary procedure. The actual belief in such significance is quite on a par with the practice of savage tribes that put to death babes which their fortune tellers decided were born at an evil hour. And yet so strong are these superstitious tendencies that fortune tellers and palmists practice a suspicious if not entirely fraudu-

lent trade in all the large American cities, and business men, as well as men and women of all classes, consult them on financial ventures, love affairs, and the critical enterprises of life. Nothing could more pointedly illustrate the danger that lurks in a yielding to the superstitious habit, or permitting it to extend beyond the playful realm, where, as is true of myth and fairy tales and legends, it adds an innocent spice to adventures of human interest. Education insists that the mind's habits shall be formed by a scientific training, without stunting the imagination or neglecting the poetic and religious interpretation of life; for in all this there is illumination and progress. But superstition is stagnant and unprogressive; it is about the same in savage conditions, in the days of medieval darkness, and among the ignorant of all stages of civilization. Superstition survives somewhat naturally in those whose careers, like those of sailors, are constantly at the mercy of uncertain ventures; it may be for a like reason that gamblers, speculators, and others following venturesome forms of pursuits have a strong belief in luck and signs. Yet the more widespread tendency responsible for credulity is the inability to grasp the all-comprehensiveness of scientific thinking, and to cling to the suspicion that outside this established realm of cause and effect there is another type of influence, of an occult or hidden order, which now and again with a personal motive directs human fate. However inconsistently, the two tendencies manage to persist in the same mind, which in most affairs reacts scientifically, but keeps certain reserved areas for the exercise of the older type of beliefs. Such lapses or partial developments maintain superstitions and the attempted revival from time to time of pseudo-scientific systems, that are entirely out of keeping with the spirit and the life of the twentieth century and the educational ideal of a democracy. J.J.

**Relating to Various Beliefs.** The following articles in these volumes, while not all bearing on superstition, are of interest in this connection:

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| Alchemy | Occult |
| Astrology | Palmistry |
| Clairvoyance | Phrenology |
| Conjuring | Physiognomy |
| Demonology | Psychical Research |
| Divination | Psycho-Analysis |
| Faith Cure | Spiritualism |
| Hypnotism | Subconsclous |
| Magic | Suggestion |
| Medium | Telepathy |
| Mesmerism | Theosophy |
| Mind Reading | Trance |
| Necromancy | Witchcraft |

**SUPPLY AND DEMAND.** In economics, supply and demand refer to the quantity of a commodity on the market compared with the demand for that commodity for immediate use. The relation of these conditions determines in a large measure the price of the commodity. If the supply is greater than the demand the price is low, and if the supply is not sufficient to meet the demand the price is high. For a detailed discussion of this principle see ECONOMICS, subhead *Supply and Demand.*

**SUPREMACY,** *su prem'a si,* ROYAL, an English legal term used to denote the power of the king over the Established Church. Until the period of the Reformation in England, the Pope had been the acknowledged head in ecclesiastical matters. In 1534, after the Pope had refused to annul the marriage of Henry VIII and Catharine of Aragon and to declare the marriage with Anne Boleyn valid, Henry induced Parliament to declare him head of the English Church. Twenty years later Mary had this act repealed, but in the reign of Elizabeth Parliament passed a new Act of Supremacy. To-day the theory of royal supremacy is recognized, but the king presumes to exercise no control over spiritual matters. See CHURCH OF ENGLAND.

**SUPREME COURT OF THE UNITED STATES.** This is the highest judicial tribunal in the American republic and the most dignified body of its kind; its members are vested with greater power than is delegated to any other court in the world. Its existence was authorized in the Constitution of the United States (Art. III, Sec. I):

> The judicial power of the United States shall be vested in one Supreme Court, and in such inferior courts as Congress may from time to time ordain and establish.

The Constitution did not declare the method of organization of the court nor specify the number of justices of which it should be composed. To Congress was delegated the duty of organization, and in 1789 a law was passed which provided—

> * * * that the Supreme Court of the United States shall consist of a Chief Justice, of five Associate Justices, any four of whom shall be a quorum, and shall hold annually at the seat of government two sessions, one commencing the first Monday of February and the other the first Monday of August.

It is an error to give the members of the Supreme Court the title of *judges.* The act of Congress referred to them as *Justices,* a title of greater dignity and one which declares by inference their more exalted station. As the

**SUPREME COURT MEMBERS.**

Standing, left to right: Brandeis, Pitney, McReynolds, Clarke. Seated, left to right: Day, McKenna, White (Chief Justice), Holmes, Vandevanter.

# *MEMBERS OF THE SUPREME COURT*

**(References appear in order of appointment.)**

**WHITE, Edward Douglass,** Chief Justice. See page 6271.

**McKENNA, Joseph** (born 1843), is a native of Pennsylvania, but he removed to California at the age of 12 and settled with his parents at Benicia. He was graduated from the Collegiate Institute in that town in 1865, and in the same year was admitted to the bar. Entry into public life began by election as prosecuting attorney. From 1884 to 1892 he was a member of Congress from California. President Harrison, in the latter year, appointed him a United States Circuit Judge; in 1897 he became Attorney-General of the United States in the Cabinet of President McKinley, in which he served until January 1898, when he was appointed an Associate Justice.

**HOLMES, Oliver Wendell,** Associate Justice. See page 2812.

**DAY, William Rufus** (born 1849), was born in Ohio, and he has made that state his home. He was graduated at the University of Michigan in 1870 and two years later was admitted to the bar. He began practice in Canton, O., and filled several local judgeships. In 1897 he became an assistant Secretary of State, and was appointed Secretary of State by President McKinley in 1898. The next year he received the post of United States Circuit Judge. In 1903 President Roosevelt placed him on the Supreme Bench.

**VAN DEVANTER, Willis** (born 1859), is a native of Indiana and was graduated from De Pauw University in that state and from the Cincinnati College of Law. In 1884 he moved to Wyoming and began his public career as a commissioner to revise the state statutes. He was a member of the territorial legislature, and in 1889 was chosen chief justice of the state supreme court. From 1897 to 1903 he was an assistant Attorney-General of the United States, then for seven years was a United States Circuit Judge. In 1910 President Taft appointed him to the Supreme Court.

**PITNEY, Mahlon** (born 1858), is a native of New Jersey, and he has made that state his home. He was a classmate of Woodrow Wilson at Princeton University, from which he was graduated in 1879. Three years later he became a lawyer and started his practice at Morristown. Elected to Congress as a Representative in 1895, he served two terms, then became a member of the New Jersey senate, holding that office also two terms. In 1901 he was raised to the post of associate justice of the state supreme court, seven years later became chancellor of the state, and in 1912 was appointed to the United States Supreme Court by President Taft.

**McREYNOLDS, James Clark** (born 1862), is a native of Kentucky. He was graduated from Vanderbilt University in 1882 and in 1884 in law from the University of Virginia. For several years he practiced law in Nashville, and for three years following 1900 was a professor of law in Vanderbilt University. In 1903 he became an assistant Attorney-General of the United States, then in 1907 began the practice of law in New York, and in 1913 entered the Cabinet of President Wilson as Attorney-General. In 1914 the President named him an Associate Justice of the Supreme Court.

**CLARK, John Hessin** (born 1857), is a native of Ohio, and was graduated from Western Reserve University, in that state, in 1877. The next year he became a lawyer, and practiced in Youngstown (1880-1897) and in Cleveland (1897-1914). In the latter year he was appointed United States District Judge for the northern district of Ohio, and in 1916 President Wilson named him an Associate Justice of the Supreme Court.

**BRANDEIS, Louis Dembitz.** See pages 893 and 6305.

demands upon this court have increased, there have been additions to the number of justices; there are at present one Chief Justice and eight Associate Justices. Members of the Supreme Court are appointed by the President of the United States, subject to confirmation by the Senate.

It has been found at times difficult to secure the appointment of men of requisite legal ability and standing who would consent to serve for the low remuneration provided by law. When the court was organized the Chief Justice received $4,000 per year and the Associate Justices $3,500. Later the Chief Justice received $10,500 and Associate Justices $10,000 per year. In 1907 the compensation was again increased to $13,000 and $12,500, respectively, and in 1911 to $15,000 and $14,500. To remove members of this high court from every political influence and to render the position more attractive, the Constitution provides that they shall hold their places during life or good behavior and that any member upon reaching the age of seventy years may retire from service, if he has been ten years a justice, and receive thereafter as long as he lives the regular salary of an Associate Justice.

**Powers of the Supreme Court.** The Constitution, in Art. III, Sec. 2, defined the classes of cases over which the Supreme Court is given jurisdiction. These are briefly summarized and explained below:

*All cases affecting ambassadors, public ministers and consuls.* These are officials of the general government whose relations are entirely with foreign governments. Therefore the national government instead of a court of the state in which the litigant may reside should have original jurisdiction.

*All cases of admiralty and maritime jurisdiction.* The high seas belong to all nations and an offense committed thereon naturally should be tried by a court representative of the nation involved.

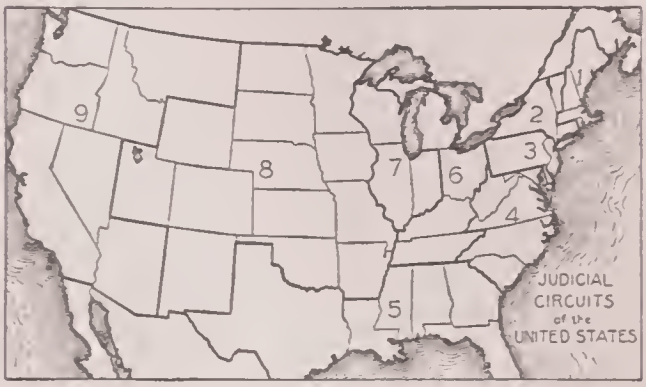
*All controversies to which the United States shall be a party.* In cases of this nature the entire citizenship of a country is interested and a national tribunal rather than a state court must decide the issues involved.

*All controversies between two or more states.* To permit a court in one of the contending states to settle such a controversy would be prejudicial to fair judgment. An outside tribunal is necessary to which all parties may appeal.

*All controversies between a state and citizens of another state and to controversies between the citizens of the same state claiming lands under grants of different states,* the same reasons apply as in the case last mentioned.

*All controversies between a state or the citizens thereof and foreign states, citizens or subjects.* If citizens of any state offend a foreign state or its citizens or subjects, the peace and honor of an entire nation is involved rather than the safety of a single state.

**Power over Legislation.** The Supreme Court possesses unique power. It is the only court in history that has ever possessed the right to deny the validity of a national law, when properly brought to its attention. A law is invalid




THE NINE JUDICIAL CIRCUITS
The territories of Alaska and Hawaii are included in the ninth circuit.

and of no effect if in any way it is contrary to the letter or spirit of the Federal Constitution. The Court is empowered to pass also upon the validity of any state law; such a law cannot remain effective if it is contrary in letter or spirit to the Constitution of the United States. Up to the present time twenty-one acts of Congress have been declared unconstitutional, the last being the income tax law of 1904.

**Inferior Courts.** The Constitution provided that the judicial system should consist of not only a Supreme Court, but of such inferior courts as Congress may establish. With the growth of the country, district courts and United States circuit courts were established. In 1912 circuit courts were abolished and the number of United States District Courts was increased. These are located throughout the country in nine Judicial circuits. One Justice is assigned to the oversight of each circuit.

**Chief Justices.** Since the organization of the Supreme Court there have been nine Chief Justices. The longest tenure of office was that of John Marshall, who served more than thirty-four years. Following is a complete list:

**John Jay,** of New York. Appointed in 1789 by President Washington, resigning in 1794 to accept a diplomatic mission to England. See JAY, JOHN.

**John Rutledge,** of South Carolina. Appointed in 1795 by President Washington. He presided over one term of the court but the Senate refused to confirm his appointment in December of that year on the ground of lack of qualification.

**Oliver Ellsworth,** of Connecticut. Appointed in 1796 by President Washington. He resigned in 1799 to accept appointment as minister to France.

**John Marshall,** of Virginia. Appointed in 1801 by President Adams, and served until 1835. William Cushing of Massachusetts was appointed but declined the honor. See MARSHALL, JOHN.

**Roger B. Taney,** of Maryland. Appointed in 1836 by President Jackson. He served until his death in 1864. See TANEY, ROGER B.

**Salmon P. Chase,** of Ohio. Appointed in 1864 by President Lincoln. He served until his death in 1875. See CHASE, SALMON P.

**Morrison R. Waite,** of Ohio. Appointed in 1874 by President Grant. He served until his death in 1888.

**Melville W. Fuller,** of Illinois. Appointed in 1888 by President Cleveland. He died in 1910. See FULLER, MELVILLE W.

**Edward D. White,** of Louisiana, then an Associate Justice, was appointed in December, 1910, by President Taft. He is eligible to retirement. See WHITE, EDWARD D. E.D.F.

Consult Carson's *History of the Supreme Court of the United States, with Biographies of All Justices;* Moore's *The Supreme Court and Unconstitutional Legislation.*

**SURABAYA,** or **SOERABAYA,** *soo rah bah' yah,* the largest city of the island of Java, and the capital of a residence (province) of the same name. It is situated on the northern coast on the Surabaya Strait, and lies opposite the small island of Madura. Surabaya is the naval and military headquarters of the Dutch East Indies, and is the most important commercial center of Java. A fine government house and a mint are among the principal buildings, and a naval arsenal, also a cannon foundry and shipbuilding yards are points of interest. The exports include rice, cotton, coffee and sugar. Population, about 150,100, including more than 8,000 Europeans. See JAVA.

**SURAKARTA,** or **SOERAKARTA,** *soo rah kahr' tah,* or **SO'LO,** the capital of the residency of Surakarta, Java, situated on the navigable Pepé River, in the center of the island. The town is connected by rail with Jokjakarta, Surabaya and Samarang. A garrison and a fort are features of interest, and the emperor of Surakarta, a sovereign in name only, resides here, maintained in magnificence by the Dutch. The chief exports are rice, cotton, coffee and sugar. Population, about 118,000, including over 1,500 Europeans.

**SURAT,** *soo rat',* the capital of the district of Surat, in the province of Bombay, British India, situated near the western coast, on the Tapti River, about 150 miles north of the city of Bombay (see map of Asia opposite page 417). For two centuries Surat was a city of great commercial importance, and was classed among the most populous cities of Asia, but it has declined since the English East India Company removed to Bombay. It rose to prominence during the War of Secession in America, when it became the shipping point for great quantities of India cotton. The four Mohammedan mosques, Parsee and Hindu temples, a clock tower eighty feet high and a medieval castle prominent on the river front are among the chief points of interest. Textiles and small ornamental objects are manufactured, and cotton and grain are exported. A British military camp is stationed at Surat. Population in 1911, 114,868.

**SURGERY,** *sur' jer i,* a department of medical science that has made extraordinary progress since the beginning of the nineteenth century. Surgery attempts to cure disease and to overcome the effects of injury by various operations in which the surgeon's knife has a prominent part. While this form of medical practice was known to the ancient Egyptians and to the Greeks and Romans, it did not become a powerful force in saving human life until the nineteenth century, when the use of anesthetics became general, and Lister, Pasteur and other scientists made known their marvelous discoveries in the field of bacteriology. At the present time the field in surgical practice is almost without limit.

Some of the most remarkable cures have been effected in the case of abdominal diseases. It is not considered an unusual operation, for instance, to remove the affected part of a diseased intestine, even several feet of it, and to sew the severed ends together. Sometimes two openings are made in the intestine, one above the diseased part and one below. Then the two openings, placed opposite each other, are united, and the contents of the organ follow the new route. An enlarged spleen, a diseased gall bladder or a diseased kidney may be removed and the patient make a complete recovery. Diseased kidneys are also opened and drained and freed of abscesses, and a floating kidney is sewed fast to the proper place of attachment. These are but a few of the successful operations that are performed by modern surgeons in treating diseases in the abdominal cavity. Great advance has also been made in the treatment of brain diseases. Tumors and abscesses in this organ can be successfully removed, cut arteries be secured, gunshot wounds cured, and pressure on the brain corrected. Certain forms of epilepsy caused by disease of the brain have been cured by operation. Other triumphs of surgery are the correction of squint (crossed eyes), grafting of

healthy skin on raw wounds or burns, transfusion of blood, straightening of crooked legs, and transplantations of healthy organs, pieces of bone and tissues to take the place of diseased parts. The knife is still the most important means of cure for cancer, and surgery is successfully applied in numerous cases of goiter —disorders that tax the skill of the physician.

In the days before the development of antiseptic surgery many lives were lost because of the unavoidable after effects—fever, abscesses, blood poisoning, gangrene, etc. Such complications as these were the result of ignorance. Surgeons were not particular about the state of cleanliness of their hands, clothing, instruments or bandages, to say nothing of the patient, and, furthermore, they did not understand the necessity for precautions in this respect. Contrast the old methods with those of the modern operating room. The skin in which the incision is to be made is scrubbed with soap and water, then with ether and then with a powerful antiseptic solution like corrosive sublimate and water. Until the operation takes place this surgically-clean area is kept covered with an antiseptic dressing. The instruments are thoroughly disinfected, and during the operation, whenever they are laid down they are placed either in a tray containing an antiseptic solution or upon disinfected towels and sheets. If a sponge or instrument happens to fall on the floor it is laid aside until it is again disinfected. Surgeons and nurses scrub their hands and nails in soap and water, alcohol and an antiseptic solution, and their linen aprons are likewise surgically clean. All bandages and dressings receive the same careful attention, so that the dangers of pus formation and similar after effects are reduced to a minimum. In other words, wounds are kept free from germs.

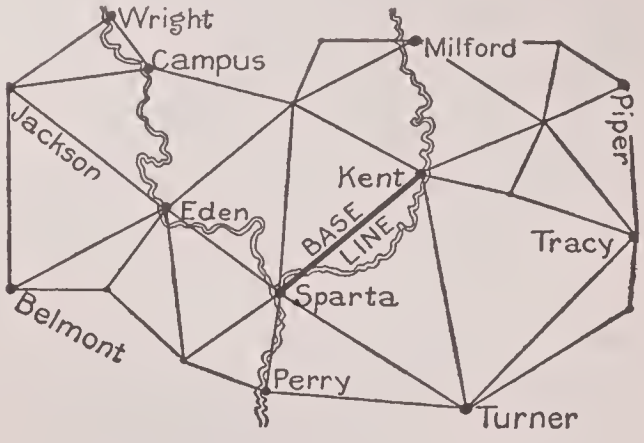
The efficacy of modern surgical methods was tested on a large scale in the War of the Nations, when the wounded were cared for by the thousands. In the base and field hospitals maintained by the belligerents all that science could bring to bear on the subject was put to the test, and marvelous were the results achieved. One of the discoveries that attracted much attention was a new method of irrigating wounds, the idea of Dr. Alexis Carrel (which see). Though many men left the hospitals permanently maimed, large numbers were saved from terrible disfigurement by means of modern surgery, and untold numbers of lives were saved through operations conducted on scientific principles. S.C.B.

Consult Fowler's *The Operating Room and the Patient;* Ashhurst's *Surgery.*

**Related Subjects.** The subject of surgery is closely connected with the following topics in these volumes. Since a number of these have extensive indexes the range of reading indicated is a wide one.

Amputation
Anatomy (with list)
Anesthetic
Antiseptic
Bacteria and Bacteriology
Bandage
Disease (with list)
Fracture
Granulation
Lithotomy
Medicine and Drugs (with list)
Tourniquet
Trephining

**SURVEYING,** *sur va'ing,* the art of ascertaining the shape and area of any portion of the earth's surface, or of running lines and determining angles to fix boundaries. *Land surveying,* with which most people are familiar,




HOW AN AREA IS SURVEYED

Starting with a base line, as between Sparta and Kent, in the drawing, other lines are laid, completing a triangle. With one of the new lines as a base line another triangle is laid out. This process is continued until all the objectives have been gained.

is for the purpose of fixing boundaries and determining areas of comparatively small plots of ground. In the United States and Canada the boundaries and divisions of public lands have been fixed by government surveyors. The land surveyor uses two instruments for running his lines—a surveyor's compass or a transit, and a chain for measuring distances. The above diagram deals with land surveying.

Surveying for fixing boundaries is often called *plain surveying. Topographical surveying* is conducted on a much larger scale and includes the measuring of altitudes and mapping the elevations and depressions of the region. Topographical surveying is used in making surveys for maps, and is usually under the direction of the national government. Surveying requires a thorough knowledge of mathematics and ability to use delicate instruments with a high degree of accuracy.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Coast and Geodetic Survey | Engineering |
| Compass | Lands, Public |

**SURVEY OF PUBLIC LANDS.** See LANDS, PUBLIC, subhead *Ranges, Townships and Sections.*

**SUSA,** *soo'sa,* an ancient city of Persia, once the capital of the province of Susiana, or ancient Elam. It occupied a site on a plain in what is now the province of Khuzistan. During the reign of Cyrus it was captured from the Babylonians, and when Darius II became king in 521 B.C. he made it the ruling city over the whole Persian Empire. Several of the Persian kings built beautiful palaces, the remains of which form some of the most magnificent ruins of Asia. From the time of Alexander Susa gradually declined, until now the so-called tomb of Daniel, which is really a Mohammedan mausoleum, is the main landmark of the once famous city.

**SUSQUEHANNA,** *sus kwe han'a,* **RIVER,** a river which flows through one of the most important industrial regions in Eastern United States. It is formed by the union of two small branches whose sources are respectively Schuyler and Otsego lakes, in Central New York. The main stream flows in a general southwesterly direction to the Pennsylvania line, traverses that state in an irregular course southward, and then flows for a short distance through Maryland, entering Chesapeake Bay at Havre de Grace. Its total length is about 500 miles, and its chief tributaries are the Chemung, the West Branch and the Juniata. Considerable timber is floated on this stream, but otherwise it is useless as a commercial route because of its swift current and shallowness. On its banks lie the cities of Harrisburg and Wilkes-Barre, Pa., Port Deposit, Md., and Binghamton, N. Y.

**SUSSEX,** *sus'eks,* a town in Kings County, New Brunswick, in the south-central part of the province. It is on the Intercolonial Railway, forty-six miles southwest of Moncton and forty-four miles northeast of Saint John. Sussex is one of the more important of the smaller towns in New Brunswick. It has an agricultural college, a provincial dairy school, and provincial militia drill grounds and armory. The town owns its water and sewerage system, but a private company owns the lighting plant. The manufactures of the city include such varied products as refrigerators, butter and cheese, paper boxes, packed pork, furniture, leather and mineral water. The neighborhood has many rich farms, and also supplies salt, lime, plaster and lumber. Population in 1911, 1,906; in 1916, estimated, 2,350.

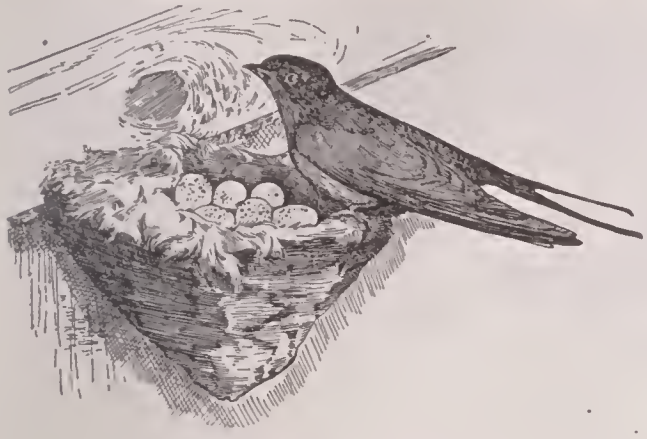
**SUT'LEJ,** a river of India, the most southerly of the five rivers of the Punjab and the largest tributary of the Indus (which see). Rising in the lofty plateau of Tibet, nearly three miles above the sea, the Sutlej winds its way through the passes of the Himalayas, traverses the hill states of Simla, and then flows in a southwesterly direction through the Punjab, joining the Indus near Mithankot. Its length is about 950 miles. The Beas and the Chenab are its most important tributaries, and below its junction with the latter it is called the Panjnad, or Five Rivers. The Sutlej is of little importance as a navigable waterway except for inland craft, but its waters are used in irrigating the arid plains of the Punjab.

**SUTTEE,** *suh te',* a variation of the Sanskrit word *sati,* meaning "good wife," is the name given to the practice formerly common among all the Hindus, of burning the widow on the funeral pyre of her deceased husband. If the husband died away from home, she occupied the pyre alone. The custom is not enjoined in the Vedas, but it seems to be of great antiquity, for when Alexander the Great visited India, about 327 B.C., he encountered instances of it. It seems originally to have been practiced only by the wives of princes, but came to be widespread, particularly among those professing Brahmanism.

In theory, the widow always was willing to sacrifice herself; in practice, compulsion was often used, but one of the emperors in the seventeenth century forbade thereafter all but voluntary immolations. The exact methods by which it took place were various. Sometimes the widow leaped upon the burning pile from a window; sometimes she lay down upon the unlighted heap, clasping in her arms the dead body of her husband; and sometimes she herself was required to set fire to the pile. Lest her courage might fail, and she might try to escape, attendants often held her body down with poles.

The British always disapproved of the suttee in India, but did not feel strong enough until 1829 actually to prevent it. Naturally it did not cease all at once, and it is quite probable that in rare cases the practice is still secretly maintained, although those now found guilty of aiding or abetting it are sentenced to a penal colony.

**SWALLOW,** *swahl'o,* a small, graceful bird, with long, powerful wings, small, weak feet fitted only for perching, and a large mouth



The swallow is come!
The swallow is come!
O, fair are the seasons, and light
Are the days that she brings,
With her dusky wings,
And her bosom snowy white!
—LONGFELLOW: *Hyperion.*

adapted to the capture of insects, upon which it feeds almost exclusively. It devours countless numbers of mosquitoes.

Swallows are found in all parts of the world. Most of them are migratory, flying great distances to avoid cold or to find a food supply. So far as is known they migrate by day, flying together in large numbers and spending the nights in woods or marshes. They nest both in pairs and in colonies. Some make their homes in holes in banks or trees, and others build rough, stuccoed nests of clay or mud, which they place on beams of bridges or on rafters in barns. Several species have modified their nesting habits through their contact with man. Their eggs are usually four or five in number, the color being pure white or white spotted with brown.

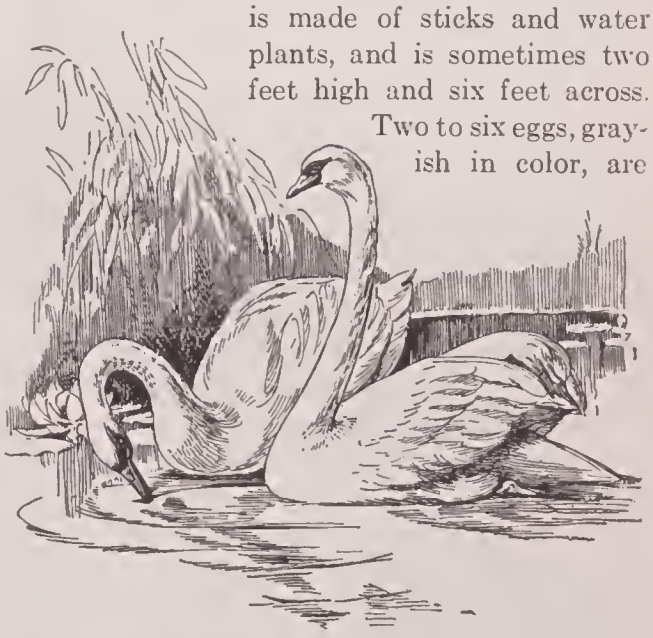
Among the swallows of North America are the *barn swallow,* with steel-blue back, chestnut-colored breast and deeply-forked tail, perhaps the swiftest in flight of all birds; the *cliff swallow,* distinguished from the barn swallow by its square tail; the *tree swallow,* which often nests in bird houses; and the *purple martin,* described in these volumes under MARTIN.

Consult Nuttall's *Manual of the Ornithology of the United States and Canada;* Davie's *Nests and Eggs of North American Birds.*

**SWAN,** *swahn,* a stately water bird, belonging to the same family as the geese and ducks. The beauty of its snowy plumage and the proud poise of its long, graceful neck have ever suggested to the song writer and the poet a majestic white ship sailing over the waters. It is a poetic fancy of unknown origin that the swan chants its own death dirge, whence the "swan song" famed in legend and in verse. This tradition has no scientific basis, but it has been the inspiration of many charming poetic lines, such as are found in the *Evening Songs* of the German poet Heine, printed herewith.

There are eight species of the swan group, found in various parts of the world. They have the common habit of migrating in V-shaped flocks, and of uttering loud, trumpetlike notes when on the wing. They subsist on the seeds and roots of water plants and worms and mollusks, dipping the long, curving neck far into the water as they probe the bottom in search of food.

The well-known *American,* or *whistling,* swan nests in the vicinity of the Arctic Ocean and the Hudson Bay region, migrating in winter as far south as the Gulf of Mexico. Between October and April large flocks of the whistling swans wend their way southward, flying, it is said, at the rate of 100 miles an hour, and filling the air with sounds that range from deep bass notes to the shrillest tones of a clarinet. The nest, lined with down from the bird's own body, is made of sticks and water plants, and is sometimes two feet high and six feet across. Two to six eggs, grayish in color, are



And over the pond are sailing
Two swans all white as snow;
Sweet voices mysteriously wailing
Pierce through me as onward they go.
They sail along, and a ringing
Sweet melody rises on high;
And when the swans begin singing
They presently must die.
—HEINE: *Evening Songs.*

laid in June. The young are at first covered with grayish-brown down, which becomes snowy-white by the end of a year.

This species is a little less than five feet long, and is entirely white except for a yellow spot between nostrils and eyes. The legs, feet and bill are black. Similar to the whistling swan

is the *trumpeter,* an American bird now rarely seen. It is larger than its whistling cousin and has a call resembling the tones of a French clarion. Except for the presence of the yellow spot on the head of the whistler, these swans are alike in plumage.

In the eastern hemisphere are found the *European whistling* swan, *Bewick's* swan, a smaller bird, and the *mute* swan, the majestic species commonly seen in zoölogical gardens, parks and estates. It is said that it never uses its voice in captivity. A beautiful species known as the *black* swan, which has a scarlet bill banded with white, is native to Australia. In South America is found the *black-necked* swan. M.A.H.

Consult Beebe's *The Swans,* in report of the New York Zoölogical Society (1906).

**SWEATING SICKNESS,** a very dangerous epidemic which swept over Europe at intervals during the fifteenth, sixteenth and early eighteenth centuries. Englishmen seemed especially susceptible to it, and were attacked both at home and on the Continent. The disease, which had as its victims chiefly strong, healthy men, was characterized by a short chill, headache, coma and profuse perspiration. It ran its course in about a day, and was fatal to a large number of victims. The sweating sickness is always to be found in some part of the world, but it is to-day generally called military fever.

**SWEATSHOP SYSTEM,** the name applied to an industrial policy by which the manufacture of goods is carried on outside of the owner's premises under conditions so unfavorable that they have aroused vigorous public protest. The name *sweatshop* suggests a place of grinding toil; the system, known also as the *sweating system,* has for its victims poor people who under its operation unhampered by law have no means of escape from despair.

The manufacturers of clothing instituted the policy by contracting for the making of much of their product outside their own shops. Rents were saved, responsibility was shifted, management expenses were decreased and factory laws evaded. They probably did not foresee the evils which would result from the contract system. Under the system a man or firm receiving a contract will sublet it to a small shop in a tenement district where the people are in the grip of poverty and where labor is therefore cheap. The owners of such shops take contracts at as high prices as they can force from the middleman and pay their employees by what is known as piecework, giving them little more than enough to keep them alive. Working for so little, the employees often spend from twelve to eighteen hours a day at their tasks to make their weekly wage as large as possible.

Another side of the system affects the home even more directly. Often a contractor will give work to a man who takes it into his home. His house becomes little better than a workshop, and he presses his family, even including little children, into the daily labor, and here, too, the hours of work may extend into the night.

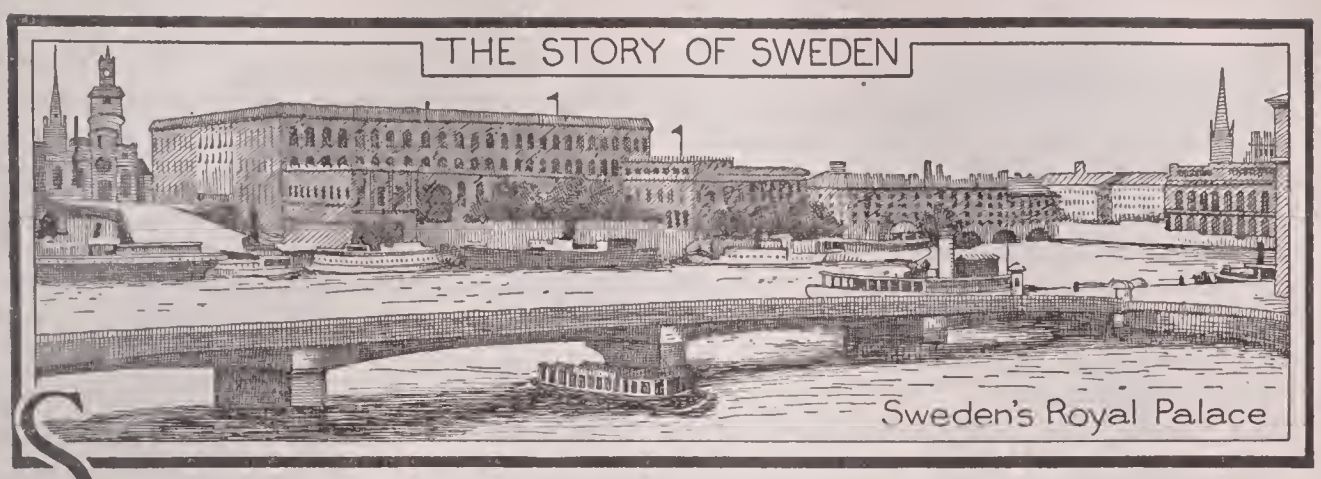
The sweating system is thus charged with overcrowding in shops, developing insanitary conditions, forcing children into labor without safeguards, and causing an increase in disease and deformity due to confinement. The helpless workers are unable to improve their condition within their own ranks, because they are scattered and their employment is irregular. Complaints may deprive them of even the slight income they are able to earn.

The above description pictures the system in its worst aspect in great cities, but the statement is not overdrawn. So scandalous have been disclosures that thousands of people have pledged themselves not to purchase clothing made under the contract system. Public attention was first called to the matter when it was found that diseases from the tenements were carried in the new clothing manufactured under the sweating system. Legislatures have taken official notice of the evil, and in some states have remedied conditions by laws which demand light, airy, roomy buildings, reasonable hours of labor, regular inspection of machinery and premises, and restrictions upon employment of children. In the states of Massachusetts, New York, Ohio and Illinois the laws provide that all rooms where such work is performed shall be licensed and regularly inspected. There has also been a growing tendency within recent years among manufacturers to abate the evil. Many of the largest clothing producers have equipped buildings with plenty of room and every modern device to provide security and health, and they pay wages which assure improved living conditions. E.R.F.

Consult Adams and Sumner's *Labor Problems: A Textbook.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

Eight-Hour Day
Factory and Factory System
Labor Legislation
Labor Organizations




**SWE'DEN,** a kingdom of Northern Europe, occupying the eastern and larger portion of the Scandinavian Peninsula. Because of the great number of lakes, rivers and watery lanes in Sweden, the country has been called a "vast fresh-water archipelago," and there is an old saying that when God divided the water from the land, Sweden was overlooked.

**Size and Location.** Having an area of 172,963 square miles, Sweden is a little less than three times the size of the state of Michigan, and is about one-half as large as British Columbia. It is almost 200 miles longer than the state of California, but is not so wide. About one-twelfth of the total area is under water. The seacoast extends 1,400 miles when measured in a straight line, but although the bays and indentations are not so numerous or deep as those of Norway, the coast is penetrated by many inlets, and over 4,700 miles are washed by the sea. The Gulf of Bothnia and the Baltic Sea separate Sweden and Russia, and the Cattegat and Skagerrack lie between the southern end of Sweden and that of Norway.

**The People.** The Swedes are an enlightened and educated people, and with the other Scandinavians are in the front ranks of the world's progressive peoples. They are more vivacious and light-hearted than their western kinsmen, the Norwegians, but they have the same reputation for frankness, honesty and industry. If one expects to see the picturesque national costume of Sweden in its modern cities, he will be disappointed, for except on festival days and in a few rural communities, it is no longer worn.

Large numbers of Swedes have emigrated to the northwestern states of the American Union. Nevertheless, the population has doubled in the last century. In 1910 the inhabitants numbered 5,522,403, and in 1914 the population was estimated at 5,679,607. With the exception of 25,300 Finns, 7,100 Lapps and 1,000 foreigners, the entire population is Scandinavian. A large proportion of the inhabitants live in the rural districts. The largest cities are Stockholm, the capital, Gothenburg, Malmö and Norrköping.

**Religion and Language.** The Swedish people are very religious, and are much interested in all phases of Christian social work. All but one per cent of the population are members of the Swedish Lutheran Church, which is the State Church. The clergy are supported by the parishes and the proceeds from the sale of Church lands. With the exception of the Mormons, who were expelled in 1912, all denominations are tolerated. Among the dissenters, the Methodists and Baptists are most numerous.

The Swedish language is a North-Germanic tongue, and it closely resembles the Danish. It has, however, a more delicate and musical accent than the Danish, and not only the correct pronunciation, but the very meaning of the word depends upon the accent or variation in the tone of the voice.

**Literature.** Sweden has produced some of the world's greatest thinkers and literary men, among whom are Bellman, the national poet, Swedenborg, a religious philosopher, and Linnaeus, the naturalist. Swedish literature had its beginning in the written laws of the thirteenth century, and the earliest verse consisted of the popular ballad and folk song of the fifteenth century. The Renaissance and Reformation, which so greatly influenced the literature of continental Europe and England, were scarcely felt in Sweden and Norway. Swedish literature reached its height during the reign of Gustavus III, himself a writer and great patron of learning. This was the age of Bellman, Swedenborg and Linnaeus. At the close of the nineteenth century, which produced the poets Tegnér, Stagnelius and Runeberg, the modern spirit of realism swept over Sweden. The greatest writers of the modern period include Strindberg, the radical dramatist, and

Selma Lagerlöf, a novelist who won the Nobel Prize for literature in 1909.

**Education.** Illiteracy is almost unknown in Sweden. Education is free and compulsory, and an excellent system of elementary and high schools is maintained, under governmental supervision. There are fifteen normal schools and many technical and navigation schools. The universities are at Lund and Upsala; the latter, founded in 1477, is one of the oldest universities in Europe.

**The Land.** The mountainous sections of Sweden are confined to the northern part of the country, called *Norrland,* and to the range of rocky precipices and mountains along the Norwegian frontier. The most rugged scenery and highest peaks are in the north, where the lofty, snow-crowned Sarjektjokko and Kebnekaisse rise 7,000 feet. Among the deep ravines and steep precipices of these mountainous regions there are green meadows and beautiful lakes, and their long, eastern slopes are scarred by many torrents which in the lowland sections widen into broad channels and innumerable lakes. Southeast of the lowlands of Central Sweden are the rolling, forest-clad hills of the Smaland Uplands, and in the extreme south lie the fertile plains of Scania, the best agricultural region in the country.

LOCATION MAP

The present boundaries of Sweden reduce it to the rank of one of the small countries of Europe in area, but its commercial importance is not to be measured by its size.

The wooded and rocky coast of Sweden is picturesque, but it has not the rugged grandeur of the fiords of Norway. The entire eastern coast is penetrated by bays and sounds, and is bordered by many islands, which are most numerous near the city of Stockholm. Gotland and Oland, two of the largest islands in the Baltic Sea, belong to Sweden. The coast and islands of the Gulf of Bothnia are rugged, but not lofty. On the Baltic, gleaming white *klints,* or cliffs, alternate with low beaches, but gloomy fields of bare cliffs border the shores of the Cattegat and Skagerrack, and dangerous rocks lurk just below the surface of their waters.

**Rivers and Lakes.** Most of Sweden's many rivers rise in the highlands along the Norwegian border and flow southeast to the Gulf of Bothnia and the Baltic Sea. Among the largest of these rivers are the Tornea, flowing 290 miles through large lakes and forming the boundary with Russia; the swift Lulea, the Pitea, the Skelleftea, the Indals, the Dal and the Angermann, which is navigable seventy miles by seagoing vessels. The Klar, rising in Norway, flows south to Lake Wener, and the Göta, the most important commercial river, flows from Lake Wetter to the Cattegat. Six beautiful falls in the latter river, at Tröllhattan, furnish 700,000 horse power, making this city the chief industrial center of Sweden. Navigation is extended beyond the falls by means of locks, and the river, connecting with canals and lakes, forms a water boulevard across the country (see *Transportation,* below).

The numerous picturesque lakes, bordered by wooded shores, not only furnish some of the greatest beauties of Swedish scenery but also are of vast importance in navigation, and they abound in fish. The lakes of the lowland region are larger than the mountain tarns. Lake Wener has an area of 2,114 square miles, and Lake Wetter of 715 square miles. Other large lakes are Hjelmar and Mälar; the latter washes the shores of 1,300 islands, and on its shores Stockholm, "the Venice of the North," is situated.

**Climate.** Although the moderating influence of the Baltic Sea and Gulf of Bothnia is felt on the eastern coasts, no part of Sweden has so equable a climate as that of Southern Norway, where the seasons are tempered by the Atlantic winds. There is a wide difference in the annual temperature of the northern part of the country, which lies within the Arctic Circle, and that of Scania, which is 900 miles farther south. Winters in the north last nine months, and in the south they are only two months shorter. The seasons of spring and autumn are very short, and in some regions are lacking altogether. At Stockholm the average temperature for July is 63° and for January 24°. The rainfall averages about twenty inches. It is heaviest during August, and the greatest amount falls in the south. In the northern part of the country the precipitation rarely exceeds thirteen inches.

**Agriculture.** Sweden has always been predominantly an agricultural country, but owing to the recent development of manufacturing and other industries the population is now about equally divided between farmers and those who follow other pursuits. The farms are generally small and are owned by independent

# SWEDEN

Gustavus Adolphus

Peasant Children

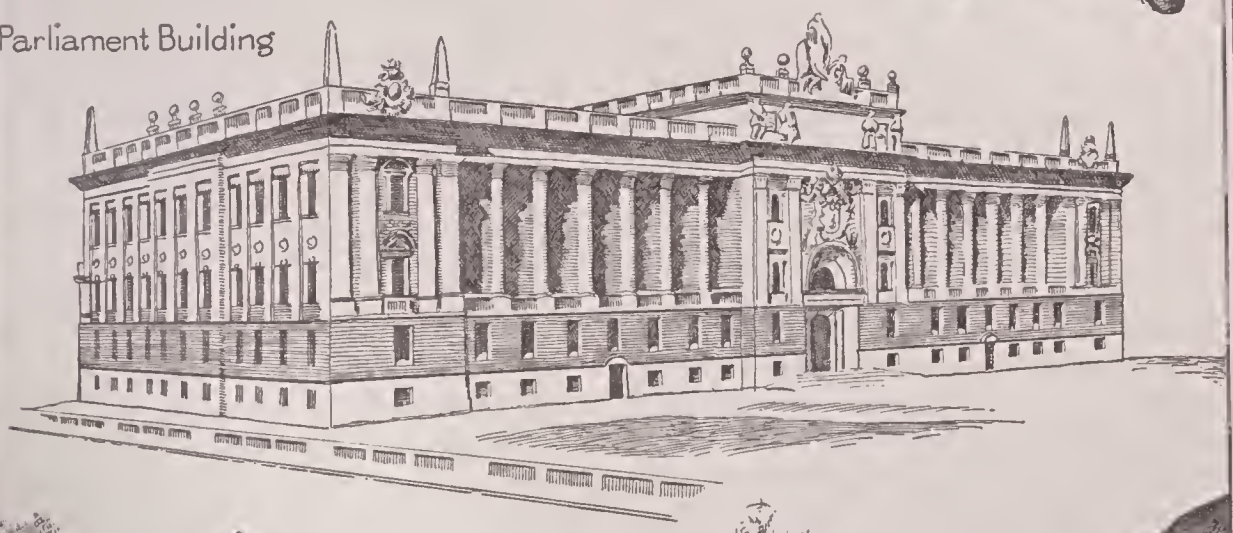
Coat of Arms

Swedish Peasant and Wife

Skate Sailing

Ski-ing

Parliament Building



A Home in the Country

A Village Street

farmers. Scania and the Baltic islands are the most productive regions. Much of the marsh land in the lowlands is being reclaimed and cultivated. The principal crops are rye, oats, barley, wheat and sugar beets. Barley is the only cereal raised in the north, and the cultivation of sugar beets is largely confined to Scania and Gotland, the latter the most valuable of the Baltic islands.

Over three per cent of the land is in natural meadow, and cattle raising and the herding of swine are important. Sweden produces two-thirds of the cattle of the Scandinavian peninsula, and quantities of dairy products are exported to England and Denmark. There is a state department of agriculture, and there are many agricultural high schools and societies. Horticulture is also important; there are large botanical gardens at the universities, and nurseries are maintained by the government. Primitive methods of cultivation are now seen only in isolated districts.

**Forests.** More than one-half of Sweden is timberland. The uplands and mountains are clothed with dense growths of pine, spruce, birch and mountain ash; thick groves of oak border the lowland lakes, and beech forests separate the cultivated fields of Scania. One-third of the woodlands are public, the larger part of which belongs to the Crown and is controlled by a large forest service. Excessive cutting of timber and other abuses characteristic of America are prevented by law. An extensive area in the north has been made a national park, where hunting and logging are prohibited. There is an institute of forestry at Stockholm, and other minor forestry schools are maintained by the government.

**Fisheries.** The calm waters of the sea inlets are excellent fishing grounds, and sea fishing has long been one of Sweden's principal industries. Herring is the most important product, and there are large salmon fisheries in the mouths of the northern rivers. Sweden's export of salt and canned fish is not as large as that of Norway, and in recent years the annual catch has decreased in value. There are not nearly as many fish in Swedish as in Norwegian waters.

**Mining.** Sweden's mines are one of its chief sources of wealth. The northern and midland regions are especially rich in iron, and with the introduction of modern machinery the development of the mines has been rapid. Swedish iron ore is noted for its purity, and it excels that of any other European country. The annual output of iron is almost 7,500,000 tons, of which 6,500,000 tons are exported. Copper is mined extensively in Falun, and deposits of silver, coal, lead, zinc and sulphur pyrites are found in various parts of the country. There are schools of mining at Stockholm, Falun and Filipstad.

**Manufactures.** The vast power furnished by the southwestern rivers and the cheap electrical power developed by its use are building up large manufacturing industries. Factories are scattered throughout the small towns and rural districts, and a great many of the employees live in the country. In the north, especially along the Gulf of Finland, there are numerous sawmills. Lumber and timber products, including furniture, wood pulp, paper and pasteboard, are the chief manufactures of Sweden. There are large iron smelting plants and foundries in the midland districts, and the porcelain and glass factories, flour and woolen mills and sugar refineries are also important. Tröllhattan, Norrköping, Stockholm and Gothenburg are the chief manufacturing cities.

**Transportation and Commerce.** Besides many excellent roads and about 9,000 miles of railroad, Sweden has 2,500 miles of inland waterway afforded by the many rivers, canals and lakes. The Göta River, Lake Wener and smaller lakes and canals form a continuous highway from the Skagerrack to the Baltic, only fifty-six miles of which is through artificial canals and in which there are fifty-eight sets of locks. The canals of Southwestern Sweden are traveled in normal times by 128,000 ships annually. As the Baltic Sea was unsafe for traffic during the War of the Nations, new railroad lines between Swedish cities and Russian ports were opened in 1915, and a railroad now encircles the Gulf of Bothnia, affording transportation from Stockholm to Petrograd.

The commerce of Sweden is important for a country of its size, and its large merchant marine, consisting of over 2,800 ships at the outbreak of the War of the Nations, carries much foreign as well as domestic trade. Since 1911 there has been a uniform tariff on all Swedish imports, and a national trademark, adopted by the General Commercial Association of Sweden, is placed on all Swedish exports. The chief imports are coal, metal goods, machinery, raw textiles and foodstuffs, and the principal exports are timber products, paper, iron, live stock and dairy products. The chief ports are at Gothenburg and Stockholm, but Malmö and Helsingborg are also important.

## *Government and History*

**Army and Navy.** Military service is compulsory for all men from twenty to forty-two years of age. The first nine years consist of service in the regular army, the next four years in the reserve troops and the last seven years in the national militia, called the *Landsturm*. The total strength of the army in peace is about 670,000 men.

**Government.** Sweden is a constitutional monarchy. The constitution was adopted in 1809 and has been several times amended and modified. The executive power is vested in the king. He is assisted by an administrative coun-

SHRINKING SWEDEN

This map shows how Sweden, once the first military power in Europe, has lost territory from time to time, until now it is completely overshadowed by its powerful neighbors to the east and south, whose military activity for many years has been a source of anxiety to its people.

(*A*) Present area of Sweden; (*B*) Norway, lost in 1905; (*C*) Finland, lost in 1809; (*D*) area lost in 1721; (*E*) Western Pomerania, lost in 1814.

cil of state. The right to make laws is vested in the Diet, which consists of two chambers. In the upper chamber there are 150 members, elected for six years by the municipal and provincial representatives, or *landsthing*. They must be property owners, or must have an annual income of about $800. The second chamber consists of 230 members, elected for three years by universal manhood suffrage. The administration of justice is independent of the government. It is controlled by the Chancellor of Justice; he is appointed by the king and represents the Crown; the Attorney-General, who is appointed by the Diet, has general supervision over all courts.

*Local Government.* There is a high governor at Stockholm and a prefect in each of the twenty-four provinces. In all communes and municipalities women taxpayers as well as the men have the vote and are eligible to communal office. The communal assemblies and city councils decide all questions of local administration. Religious affairs and elementary education are controlled by parish assemblies. Liquor traffic is rigidly controlled by the government. Spirits may be sold only by responsible societies, and the profits go to the municipality.

**Early Growth of the Kingdom.** Much of Sweden's history before 1000 A.D. is legendary. Christianity was introduced in the middle of the ninth century, but was not fully established until the eleventh century, during the reign of Olaf, who defeated Norway and made Sweden the mightiest kingdom in the north. During the next 200 years Sweden's history is a story of the warfare between the Swedes in the northern part of the country and the Goths in the south, and between both of these peoples and the Danes. About the middle of the twelfth century the government and the Church were organized, and under the kings Sverker, Eric IV and Charles VII Sweden's political and economic development began.

In 1397, by the Union of Kalmar, Queen Margaret of Denmark and Norway united Sweden with the other two Scandinavian countries under its rule (see NORWAY, subtitle *Government and History*). The Swedes were restive under the predominance of Denmark, and in 1523 they broke away from the Union and elected Gustavus Vasa king of Sweden. During the reign of this great sovereign, the Reformation spread to Sweden, and Lutheranism was made the State religion. From this time development was rapid, though prosperity was temporarily disturbed by the religious struggles of the succeeding reign.

**Sweden Becomes a Great Power in Europe.** Under Gustavus Adolphus (1611-1632), Sweden became one of the greatest European military powers and commercial countries. This king's ambition for territorial expansion and his Prot-

# *OUTLINE AND QUESTIONS ON SWEDEN*

## *Outline*

**I. Location**

(1) Latitude, 55° 20′ 18″ to 69° 3′ 21″ north
(2) Longitude, 11° 6′ 19″ to 24° 9′ 11″ east
(3) Boundaries
(4) Relation to other countries

**II. Size**

(1) Length
(2) Breadth
(3) Actual area, 172,963 square miles
(4) Comparative area

**III. Geographic Features**

(1) Coastal peculiarities
(2) Mountains
  (a) Location
  (b) Greatest heights
(3) Rivers
  (a) Canal connections
(4) Lakes
  (a) Economic importance
(5) Climate
  (a) Moderating influences
  (b) Differences due to latitude

**IV. The People**

(1) Population
  (a) Increase in spite of emigration
(2) Racial peculiarities
(3) Language and literature
(4) Religion
(5) Education

**V. Resources and Industries**

(1) Agriculture
  (a) Regions where it is practiced
  (b) Chief crops
(2) Forests
(3) Fisheries
(4) Mines
(5) Manufacturing

**VI. Transportation**

(1) Railroads
(2) Rivers and canals
(3) Commerce

**VII. Government and History**

(1) Form of government—constitutional monarchy
  (a) Executive
  (b) Legislature
  (c) Judiciary
  (d) Local government
(2) Army and navy
(3) History
  (a) Early years
  (b) Union with Norway and Denmark
  (c) Sweden at the height of its power
    1. Gustavus Adolphus
    2. Charles XII
  (d) Napoleonic Era
  (e) Later nineteenth century
  (f) Separation from Norway
  (g) War of the Nations

## *Questions*

What is meant by the expression "fresh-water archipelago" as applied to Sweden?

How does the outer coast line of Sweden compare with that of Norway in length? How do the two compare if all the indentations are counted?

What Swedish author won the Nobel Prize, and when? What are her most famous works?

How long is a summer day at Stockholm? How long is a summer day in the most northern part of the country?

What is the "skerry fence" of Sweden? What are the *klints,* and where are they to be found?

What is the "Venice of the North," and why is it so called?

Why is the climate more extreme than is that of Norway,. which is in the same latitude?

How many miles of artificial waterway were found necessary in connecting the Skagerrack with the Baltic?

What king raised Sweden to a place of power among the nations of Europe?

estant faith drew him into the war in Germany. The policy of Gustavus Adolphus was continued after his death; new territory was acquired, and for some years Sweden was recognized as a great power, but in 1675 its forces were completely defeated by Frederick William of Brandenburg, its sea power was lost, and ruin was only averted by the treaty of peace.

The eyes of all Europe were again turned on Sweden during the reign of Charles XII, who invaded Denmark, Poland, Russia and Norway. Following his death Sweden was weakened by political struggles, and even Gustavus III (1771-1792), who wiped out the factions and increased the royal power, was unable to restore Sweden to its former prosperity.

**Relations with France.** Charles XIII (1809-1818), having no heir, chose Bernadotte, one of Napoleon's marshals, as crown prince. Bernadotte joined the allied powers in the final overthrow of Napoleon, and as a reward for this support, Norway in 1814 was transferred to Sweden from Denmark, for the latter country had united with Napoleon. Bernadotte came to the throne in 1818 as Charles XIV John, and during his reign and those of the succeeding kings Sweden prospered.

**Recent History.** In 1905 King Oscar II refused to give Norway a separate consular service, and Norway declared its independence but preserved friendly relations with Sweden. Two years later Gustaf V succeeded to the throne. Sweden remained as neutral during the War of the Nations as its position made possible, although its commerce and industry suffered, and its neutral rights on the sea were violated. In 1915 Sweden prohibited the export of arms and munitions to the belligerent nations and protested against Germany's submarine warfare and England's use of neutral flags. In June, 1915, friendly relations were established between Sweden and its old enemy, Russia, with regard to financial, commercial and industrial interests. In September, 1917, its neutrality was questioned by the entente allies upon discovery that its diplomatic agents were permitting dispatches to reach Germany through its Foreign Office.

**Other Items of Interest.** The chain of islands along the coast of Sweden is commonly known as the "skerry fence."

The shortness of the northern summers is in a measure compensated for by the length of the days and the many hours of sunshine. At the very northernmost point the sun may be seen continuously from May 26 to July 18, and at Stockholm it is visible for eighteen and one-half hours each day during that period.

In the southern part of the country there are more than 1,000 species of flowering plants, while in the northern regions fewer than 200 species are found.

The wild reindeer is found, though it is rare, but large herds of the domesticated reindeer are kept by the Lapps.

One of the outstanding things the visitor to the northern forests notices is the impression of emptiness and lifelessness. Even in summer there are almost no animals to be seen, and very, very few birds.

In most countries the taking of the census is a government affair, but in Sweden the census is drawn up by the clergy—an official report every ten years and an estimate every year.

One of the most universally observed and most elaborately celebrated of the national holidays is Midsummer, which falls on June 23 and 24. E.B.P.

Consult Barnes's *Things Seen in Sweden;* Kennedy's *Thirty Seasons in Scandinavia.*

**Related Subjects.** The reader who wishes more detailed information will find it in the following articles in these volumes:

CITIES

Gothenburg — Stockholm
Malmö

COAST WATERS

Baltic Sea — Cattegat
Bothnia, Gulf of — Skagerrack

HISTORY

Charles IX, X, XI and XII — Norway, subtitle *Government and History*
Denmark, subhead *History* — Oscar I and II
Gustaf V — Thirty Years' War
Gustavus I, II, III and IV — War of the Nations

LEADING PRODUCTS

Herring — Lumber
Iron — Rye

**SWEDENBORG,** *swe'den bawrg,* EMANUEL (1688-1772), a Swedish scientist and inventor and the founder of a religious sect known as the Swedenborgians, or New Jerusalem Church. He was the son of a Lutheran bishop, and was educated at the University of Upsala, going afterward to England to pursue further the study of the sciences. Returning, he published a volume of poems, edited a mathematical journal and at the age of twenty-eight wrote the first algebra ever produced in Sweden. He studied especially the science of mining, and was called by Charles XII to a chair in the Royal College of Mines. In 1718, his family

having been raised to the nobility, he took his seat in the house of nobles. Subsequently he traveled widely in the interest of scientific knowledge and published valuable treatises on metallurgy and anatomy and a diary of his experiences.

Always of a deeply religious nature, in 1745 he turned himself almost exclusively to the study of a peculiar system of theology and spiritual philosophy which he claimed to have received through direct intercourse with the spirit world. He wrote many books supporting his mystical theories, and while those who accepted his system as a whole have been comparatively few, he has undoubtedly made a strong impression on modern religious thought. Kant admits having been largely influenced by him, and Goethe embodied much of his teaching in his masterpiece, *Faust*.

Swedenborg died in London, but by royal decree his body was removed to Sweden and interred with honors at the University of Upsala. The most important doctrines advocated by him are stated in the article SWEDENBORGIANS.

Consult Worcester's *Life and Mission of Emanuel Swedenborg.*

**SWEDENBORGIANS,** *swe den bawr' ji anz,* the religious sect that follows the teachings of Emanuel Swedenborg, organized by him in London, in 1787, as the New Church or the New Jerusalem Church. Their belief, as set forth in Swedenborg's writings, regards the universe as one whole, the outward world being the counterpart of the inner and spiritual. Beneath the literal meaning of the Bible is the spiritual meaning, which is open to those who have inner discernment. Justification is not attained by faith alone, but whoever fears God and works righteously shall be saved. God is one and the real Trinity is in Christ. The last judgment has already taken place, and the New Jerusalem has descended in the form of the New Church. There is no physical resurrection, but at death men's eyes are opened to the spiritual world of which they are already a part. They are drawn to heaven or hell by their own affinities. Angels are the spirits of departed human beings.

The first Swedenborgian Church in the United States was organized in Baltimore, in 1792. The American societies are grouped into state organizations called associations, and the General Convention of the New Jerusalem Church is composed of twelve of these associations and of nine separate societies. There is a smaller organization of the sect known as the General Church of the New Jerusalem. The larger body has about 8,500 communicants; the smaller about 800. See SWEDENBORG, EMANUEL.

**SWEET ALYSSUM,** *a lis' um,* a low, spreading plant of the mustard family, bearing clusters of tiny white flowers, and having four-sided stems which contain a bitter juice. It is a hardy little plant, blooming until late in the fall, and is often used as a border for gardens and flower beds. There are single and double varieties; some are dwarfed, and others grow eight or ten inches high. Sweet alyssum is easily raised, for it grows from seeds or cuttings, and thrives in any reasonably-fertile soil.

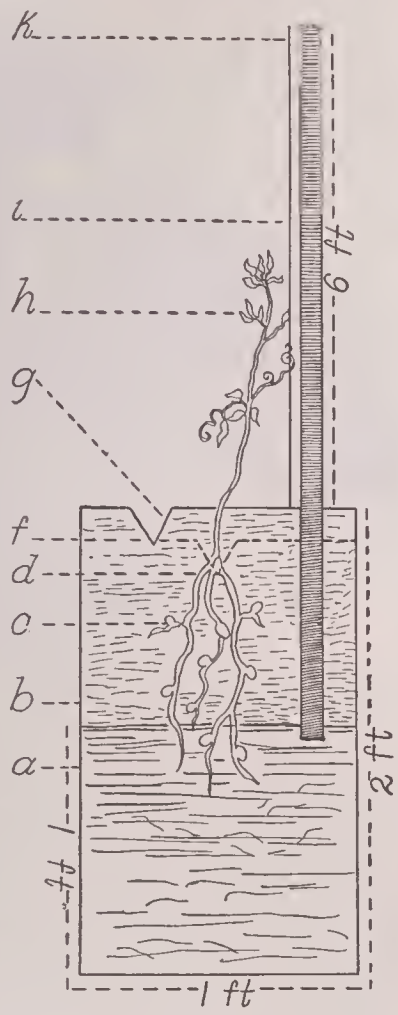
**SWEETBREADS,** *sweet' bredz,* certain glands in the calf which are esteemed as an appetizing food. There are two kinds, *neck sweetbread* and *stomach sweetbread,* the first being the thyroid gland, and the second, the pancreas. The latter is the more easily digested, and can be assimilated in less than half the time required for an equal amount of beefsteak. Great care should be taken in the preparation of the sweetbreads in order to make them palatable and appetizing. They should first soak in cold water for two and one-half hours; this water is poured off, and fresh, cold water placed in the pan, which is then brought to a boil on the stove. Boiling is allowed to continue for five minutes, after which the sweetbreads are again placed in cold water, to preserve their color. Now the fat and skin are carefully picked out, and when this process is completed the delicacy is ready to cook. Braise for one hour with meat stock and vegetables, then transfer to an oven and allow to brown. Sweetbreads may then be served with any sauce the taste may dictate. C.B.B.

**SWEETBRIER.** See EGLANTINE.

**SWEET FLAG,** a tall, reedlike plant of the arum family, which grows along brooks and in marshy places in almost all parts of the northern hemisphere. Its stiff stems are tipped by spikes of green blossoms, and it has flat leaves shaped like a two-edged sword. They spring directly from the rootstock and grow to be two feet long. From this rootstock, which is fragrant and has some medicinal value as a tonic, perfume, hair powder and other toilet preparations are made. See ARUM.

**SWEET PEA,** *pe,* a favorite garden plant belonging to the same family as the edible pea. It is cultivated for the beauty and exquisite fragrance of its flowers, which are colored blue, red, purple, pink and white, and in shape suggest the butterfly. In the year 1699 seeds of a

white variety were sent to England from Sicily, and since that time numerous varieties have been developed by gardeners and florists in various parts of the world. In some varieties the flower petals are smooth and velvety; in others they are crinkled and wavy. There are two general types—the tall-growing and the dwarf. The former, which is the more popular, produces a rough, hairy stem that climbs by tendrils and needs support.




DIAGRAM

Showing how to plant and stake the sweet pea. (*a*), one foot of manure and soil; (*b*), one foot of fine garden loam; (*c*), nodules on roots of pea plant; (*d*), the seed planted (summer) one inch deep in a furrow two inches below the surface edge of the trench; (*f*), surface soil to be leveled in as the plant grows; (*g*), furrow in which to apply liquid manure; (*h*), pea vine clinging to wire support; (*i*), wire, 4-inch mesh or chicken wire; (*k*), iron support.

Successful cultivation of the sweet pea requires a rich, well-drained soil, plenty of sunshine and free circulation of air. The seed should be sown in April, in the proportion of one ounce to thirty feet of row; plants should be at least two inches apart in the row and the rows be separated by four feet of space. As soon as the plants appear above ground cultivation should begin. The soil should be stirred lightly at least three times a week, preferably after a rain, and the rows should be kept free of weeds. Application of liquid manure and free watering of the plants are necessary. Watering should be done as often as required, and liquid manure, which is plant food, be applied at least six times during the season. This plant food can be secured by putting a wheelbarrow load of cow manure in a barrel and filling the barrel with water. Keep the barrel covered to prevent the entrance of insect pests. Stir the liquid three or four times, and then allow it to stand for a week. Then remove the froth from the top and dilute the mixture until it is the color of very weak tea. The liquid should be poured into a trench dug three inches deep and four

SWEET PEAS

inches from the vines. The accompanying diagram shows how to prepare the stakes for the vines. M.K.

Consult Kerr's *Sweet Peas up to Date;* Stevenson's *The Modern Culture of Sweet Peas.*

**SWEET POTA'TO,** a plant belonging to the same family as the morning-glory, with long, creeping stems and heart-shaped leaves. It is

PRINCIPAL CENTERS OF PRODUCTION

The figures represent the average crops for three successive years.

cultivated for its sweet, edible roots, which somewhat resemble the tuber of the common potato; from this fact the name is derived. The edible part of the potato, however, is an

underground stem, not a root, and the two plants belong to different families (see Potato). There are three general classes of sweet potato roots, with yellow, red and white flesh respectively, but the yellow varieties are the most

WHERE SWEET POTATOES GROW
Where the dots are most numerous the yield is greatest.

common. The flesh is rich in starch and sugar, and is wholesome and digestible. So-called yams are really sweet potatoes.

The plant is probably a native of America, but is now cultivated in warm countries all over the world. The most important sections in the United States, as may be seen from the accompanying diagram, are in the Southern states near the coast. Sweet potatoes thrive best in a warm, well-drained soil, and when the plants have gained a good start they require little rain. First the tubers are sprouted in a specially prepared bed, and the young "sets" are planted when about four inches tall. The roots are harvested before frost and will keep indefinitely if stored in a warm, dry place.

Consult Nordin's *The Sweet Potato: How to Grow and Keep It.*

**SWEET WILLIAM,** one of the oldest garden flowers, a member of the pink family, ranging in color from white to dark red and purple. The source of its name is not positively known, but possibly when the plant was transported from France to England the pronunciation of its French name was twisted into *Willy* and thence into *sweet William.* The fringed, velvety blossoms grow in clusters usually of one color, but occasionally a single stem contains flowers of varied hues and markings. The wild *sweet William* is a member of the phlox family (see Phlox). See illustration, in next column.

**SWETT,** John (1830-1915), a prominent American educator and writer, noted particularly as the author of *Methods of Teaching,* which for many years was the standard textbook on pedagogy in the West. He was born at Pittsfield, N. H., and was educated at Pittsfield Academy and at Merrimac Normal Institute. After teaching in district schools in his

SWEET WILLIAM

native state, he was appointed principal of a school in San Francisco, and in 1863 became state superintendent of schools in California. He received the appointment of deputy superintendent of schools of San Francisco in 1870, and six years later was promoted to the office of city superintendent. Thirteen years later he retired from active service. *The History of the Public School System of California, American Public Schools* and *School Elocution* are among his publications. As joint author with William Swinton, he compiled a number of texts on language, grammar and geography.

**SWIFT,** a small bird with strong, flexible wings, but weak feet, found in practically every part of the world. In color it is a mouse-brown or a greenish-black, some species having white throats or rumps. Swifts fly tirelessly all day, capturing their insect food while on the wing and seldom alighting. At dusk they return in large flocks, performing many graceful evolutions as they fly, to the cave, cliff or hollow tree where they live in colonies. Their notes, continuously repeated, are little more than chatterings. They build curious nests, in which sticks, leaves, etc., are cemented together with saliva, some being almost entirely composed of saliva, as the edible birds' nests of Eastern Asia. See Edible Birds' Nests.

The American swift has been forced almost entirely to the chimney as a home. In perching it clings to the wall with its feet, bracing itself with its spine-pointed tail. It is said to break off the twigs for its nest with its beak as

THE SWIFT AND ITS NEST

it flies. The nest is semicircular in form, firmly cemented to the side of the chimney. The eggs are white in color and four to six in number. Two broods are usually reared in a season.

**SWIFT,** JONATHAN, (1667-1745), an English satirist and clergyman, born in Dublin. He was unusually advanced as a child—could spell at three and at five could read any chapter in the Bible. At the Kilkenny School, and later at Trinity College, Dublin, where he was poorly supported by the charity of an uncle, his course of study was most irregular. History and poetry appealed to him, and he read them greedily, but for the set course of study he had nothing but scorn. In consequence, it was only by special favor that he obtained his degree.

JONATHAN SWIFT

**Early Discouragements.** At twenty-one he became secretary to Sir William Temple, of Moor Park, Surrey, at a salary of twenty pounds ($100) a year. He was treated as a half servant, and forced to eat at the second table, but though his pride was extreme he retained his office for five years, finding some solace in the fact that he had much time to devote to study and writing. In 1694, in an attempt at independence, he accepted a small parish in the Irish Church, in a distant, secluded place, but his dissatisfaction was deeper than before, and in a short time he returned to the Temple household. Here he remained until the latter's death. In Temple's family he became acquainted with a beautiful girl, Esther Johnson, who was to play so important a part in his life and whom he made famous as the "Stella" of his writings.

**His Literary Career.** In 1699 Swift attended the Earl of Berkeley as secretary and chaplain on a journey to Ireland, and was made vicar of Laracor and Rathbeggan. During all his clerical career he engaged in political writing, and in 1704 won wide fame on the publication of his *Tale of a Tub,* a humorous and forceful satire on insincerity and pedantry in literature and in theology. Such a work could not, however, fail to injure his chances for preferment in the Church. In the decade that followed he became a conspicuous figure in politics. Beginning as a Whig, he became so opposed to the principles of his party that in 1710 he turned from it entirely, making plain the change by accepting the editorship of the Tory *Examiner.* Through his essays he exerted a strong influence on the trend of public thought, but in 1714 he shared the Tory loss of power and was forced to content himself with an appointment to the deanery of Saint Patrick's, Dublin.

During his residence in Ireland previous to 1710, Swift had urged Miss Johnson and her friend Mrs. Dingley to make their home near him, and thus he enjoyed a continuance of his early friendship. While he was in England, from 1710 to 1713, he wrote the letters that compose the *Journal to Stella,* a work of deep biographical interest. In the same period he became involved in a connection with Miss Hester Vanhomrigh which caused him great embarrassment and resulted tragically. Upon his departure from England the young lady, driven by her love for him, followed him and settled near him in Ireland, and by some secret communication learned of his friendship for Stella, to whom she finally wrote. Having thus incurred Swift's anger, Miss Vanhomrigh died of the grief caused by the rupture of their friendship (1723).

In the year following this unfortunate affair, Swift won the lasting esteem of the Irish people by issuing the *Drapier Letters,* in which he vigorously opposed the granting of a patent for copper coinage in Ireland. Two years later appeared his *Gulliver's Travels,* a highly amusing satire on human nature. He persisted in his efforts to lighten the wrongs of the Irish, until in 1742 the fate that he had long dreaded came upon him, and he became insane. He remained an imbecile until his death. A.MC C.

Consult Smith's *Dean Swift;* Collins' *Jonathan Swift: A Biographical and Critical Study.*

**SWIFT CURRENT,** a city in the southwest corner of Saskatchewan, and on the main line of the Canadian Pacific Railway, 110 miles west of Moose Jaw and 147 miles northeast of Medicine Hat. It is also on the Vanguard-Bassano branch, by which it is forty-four miles north of Vanguard and 236 miles southeast of Bassano. The Swift Current River, which flows through the city, is not navigable. In 1901 Swift Current was a village of 121 people; by 1911 it had grown to a town with a population of 1,852; and in 1914 it was incorporated as a city. Population in 1916, 3,181.

Like most of the towns in southern Saskatchewan Swift Current is prosperous because it is in a rich wheat-growing region. It is a large shipping town, and is also a wholesale and retail distributing point. It is the seat of a judicial district, and has a land-titles office, customhouse, Dominion lands office and municipally-owned hospital. The courthouse, a conspicuous structure, was completed in 1915 at a cost of $125,000. Other attractive buildings are the town hall, erected in 1913 at a cost of $45,000; the fire hall, also erected in 1913; and three public schools, one completed in each of the years 1914, 1915 and 1916. The total expenditure for the three schools was $325,000.

**SWIMMING,** *swim'ing.* Every boy and girl should learn to swim, for the following reasons:

1. In case of accident on the water ability to swim may enable one to save his own life, and possibly the lives of others.
2. Swimming affords one of the best means of developing the muscles and invigorating the system.
3. Swimming is a delightful recreation.

Notwithstanding the importance and value of this art it is probable that not over one-third of the people know how to swim. Various reasons have been given for this lack of knowledge of a useful and pleasure-giving recreation. Chief among them are that swimming is very difficult to learn; learning to swim is dangerous to life and health, and there may be lack of opportunity. All these reasons rest upon false notions. It is nearly as easy for a person to learn to swim as it is for a child to learn to walk; it is said that the babies of the South Sea islanders can swim before they have learned to walk.

Under reasonable conditions learning to swim is attended by no danger whatever. But, granted that the learner were in some danger, would it not be more reasonable for him to confront this danger under conditions which will enable him to overcome it than to run the risk of encountering it unexpectedly without means of self-preservation?

There is scarcely a community where it is not possible to provide swimming pools.

**Preliminary Steps.** The first step towards learning to swim is to overcome fear of the water. Select a place where the water is clear and free from currents and weeds, with the bottom sloping gradually. Wade out slowly until the water reaches the waist. Take a full breath, then bend the legs until the head is under the water. Open the eyes and look at the bottom for a second or two, then rise to a standing position. Repeat the exercise until the head can be placed under water with confidence.

Having learned that you can place your head under water for a few seconds, you are ready for the next preliminary step, which consists in learning to lie in the water and float. Wade out to where the water is waist deep, face the shore, incline the body slowly, stretching the arms out straight with the palms down. As the arms and head strike the water the feet will rise. Straighten the legs and you will be able to lie in this position several seconds without sinking, if you do not attempt to raise the head. Open the eyes and paddle gently with the hands. You will see that you are moving towards the shore.

The human body as a whole is lighter than water, but some parts of it, particularly the head, are heavier than water. Consequently, when the head is partially supported in the water it is much easier to float.

Probably several exercises may be necessary to enable you to lie in the water with confidence, but you should gain this confidence before attempting to swim.

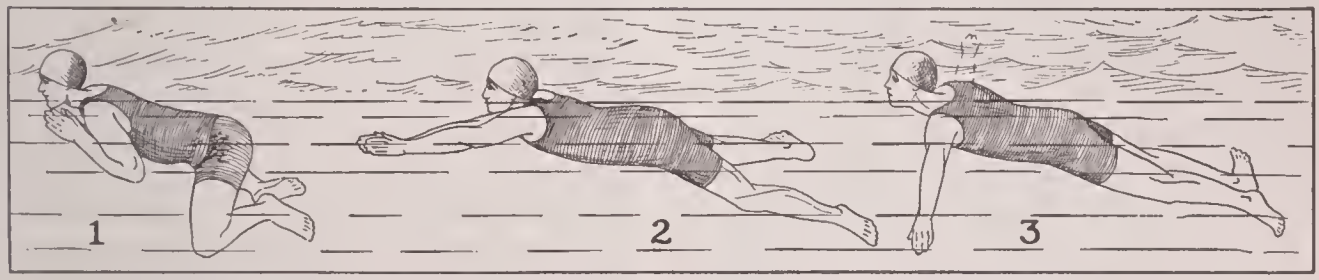
**The Breast Stroke.** The breast stroke is the simplest swimming stroke and the one that should be learned by beginners. While an instructor is of great advantage, one may learn

to swim by himself. In so doing the following suggestions will be found helpful:

1. Wade out until the water reaches the neck, and take particular notice of its buoyant force. You can scarcely keep your feet on the bottom. Continue this practice until you feel perfectly at home in water of this depth.

2. When you have gained confidence in water of the depth described above, wade out until the water reaches the chest. Face the shore. Place the hands palms together on the chest, bend forward, straightening the arms as in the act of floating, previously described. The hands should be three or four inches under the water, the palms should be downward and the fingers close together.

3. As you lean forward, and before straightening the arms, bend the knees so that the body will be in the position shown in the first illustration.




THREE POSITIONS DEMANDED BY THE BREAST STROKE

4. As the arms are straightened, straighten and spread the legs so that you will take the position shown in the second picture.

5. Swing the arms outward, describing a quarter circle with each. The palms should be turned outward so that they will act as paddles in propelling the body.

6. As you swing the arms outward bring the legs together until the heels touch. This movement also propels the body.

These motions complete the breast stroke. The movements should be made slowly, since quick, jerky movements fail to support one in the water and quickly exhaust the swimmer.

**Other Stokes.** One who has mastered the breast stroke will have little difficulty in learning what is known as the *back stroke*. Instead of keeping the arms in the water, as in the breast stroke, they are lifted into the air and carried in a sweep beyond and in front of the head, and the palms are kept upward. Then the palms are given a half turn and the arms sweep around. As they begin this latter movement the legs are drawn up, as in the breast stroke. The force of the kick which follows propels the body along as the arms are being extended for their next stroke.

The *side stroke* carries the body forward on its side. It is better to lie on the right side, for the heart action is more likely to be unimpaired and the leg action is freer. The right arm is thrown forward beyond the head, with palm downward and level with the under side of the head. It is then extended its whole length and without bending at the elbow is brought rigidly downward until the hand reaches the legs. It is then brought upward quite close to the body for the beginning of the next stroke. The left hand, scoop-shaped, is turned outward at a right angle with the forearm; and the arm, with elbow bent, is thrust forward and then makes a pulling stroke down to the left hip. The legs are opened wide, then swung together as the left arm is extended and the right arm finishes its downward stroke.

The *crawl,* or *Australian crawl,* was adapted from the South Sea islanders; it is a comparatively new stroke in America and Europe. In executing the crawl the swimmer lies flat upon the water. The legs from the knee to the feet are alternately raised above the water halfway to the knee and are brought down with all possible force, one leg at a time. The arms are bent at the elbows, the hands entering the water just in front of the head; they are then pushed sharply back and come out of the water near the hips. When the right arm is dipped the left leg is struck down, and vice versa.

The breast stroke and the three strokes explained above are the most popular with swimmers of all nations. The art of diving is explained on pages 1814-1815.

**Breathing.** Next in importance to a proper stroke is proper breathing. An expert teacher of swimming says:

> To nothing else so much as breathing is due the inability of those who can swim to keep up the speed and regularity of movement for an indefinite period.

In swimming, the breathing should be directly opposite from what it is out of the water. A quick, deep inspiration should be taken through the mouth, and the air should be exhaled slowly through the nostrils, and this should be done at each stroke.

**Use of Artificial Aids.** Expert instructors in swimming seem to be about equally divided on the advantages to be derived from the use of

artificial aids, which consist in inflated belts, inflated bags, or "wings," belts to which a rope and pulley are attached, planks, cork mattresses and the like. Without doubt one may learn to swim more quickly with one of these aids than without it. On the other hand, there is great danger of one's forming the habit of relying upon a device and not becoming an independent swimmer. If one must learn in deep water the device is a necessity, but to one who has the advantage of shallow water, artificial aids are of doubtful benefit.

One can gain much help by practicing the strokes on land, lying on a box or narrow bench. One may practice the leg movement in the water by pushing a raft or a boat in this way. W.F.R.

Consult Dalton's *How to Swim;* Spalding's *Athletic Library No. 37 R;* Corsan's *At Home in the Water.*

**SWINBURNE,** *swin'burn,* ALGERNON CHARLES (1837-1909), an English poet, born in London. His father was Admiral Charles Henry Swinburne; his mother was Lady Henrietta, a daughter of the third Earl of Ashburnham. He was educated at Eton and at Oxford, where, however, he did not complete his course. In 1861, the year that he left the university, he published *The Queen Mother* and *Rosamond,* both modeled on the Elizabethan drama; but though they were very remarkable for the work of so young a poet, they attracted little attention. In the same year he made a short continental tour, during which he visited Landor at Florence.

In 1865 his genius for the first time became recognized, when *Atalanta in Calydon,* a tragedy of exceptional metrical beauty, was published. Not long afterward appeared his *Poems and Ballads,* which brought upon him vigorous censure because of his revolt against conventional morality. The wonderful melody of the verses could not be denied, however, and it might almost be said that Swinburne, like Byron, became famous in a night. A number of political songs and odes followed, *A Song of Italy, Ode on the Proclamation of the French Republic, Songs before Sunrise* and *Songs of Two Nations.* In 1881 was completed a trilogy begun in 1865, of which Mary, Queen of Scots, is the subject, the three parts being *Chastelard, Bothwell* and *Mary Stuart.* Of his other poems may be named the tragedy *Erechtheus;* a second and a third collection of *Poems and Ballads;* the odes addressed to Victor Hugo; *Tristram of Lyonesse; A Century of Roundels;* the tragedies *Locrine* and *Rosamund, Queen of the Lombards; The Tale of Balen* and *Astrophel and Other Poems.*

**As a Critic.** Swinburne was not a painstaking judge, but arrived at conclusions by a sort of instinct that was often clear and truthful. Among his critical works are *Essays and Studies, Miscellanies, Studies in Prose and Poetry* and *Under the Microscope,* written in reply to an attack on the Pre-Raphaelites, with whom Swinburne was associated. Swinburne's poetic genius consists in his mastery of metrical form, in which he has never been surpassed in English poetry, and an almost unerring choice of the right word and phrase.

Consult Drinkwater's *Swinburne: An Estimate;* Mackail's *Swinburne.*

**SWINE.** See HOG.

**SWIN'TON,** WILLIAM (1833-1892), a Scottish-American educator, and author of widely-used textbooks, was born at Salton, in Scotland. When he was ten years old he emigrated with his parents to America, and was educated at Knox College, Toronto, and Amherst College. He taught at girls' schools in North Carolina and New York, and in 1858 became a member of the staff of the New York *Times.* During the War of Secession he was with the Army of the Potomac as correspondent of the *Times,* and at the close of the struggle traveled in the South, studying educational conditions there.

In 1869 he was appointed professor of belles-lettres in the University of California, but five years later resigned and devoted himself to the preparation of textbooks. His spelling and language books, histories and geographies were more widely used than almost any other books, and he was awarded various honors for them. In the preparation of his grammars and geographies he called to his aid as coeditor John Swett, that his methods of presenting his subject might be passed upon by a master of pedagogy. He wrote also *Rambles among Words, Campaigns of the Army of the Potomac* and *The Twelve Decisive Battles of the War* and edited *Masterpieces of English Literature.*

**SWISS GUARDS,** a famous body of Swiss soldiers organized to protect King Louis XIII of France in 1616 and annihilated by the infuriated populace during the attack on the Tuileries, August 10, 1792. Their courage and devotion to duty is commemorated in the famous Lion of Lucerne, carved in the face of a rock at Lucerne, Switzerland. This monument is simply and pathetically dedicated to the

"fidelity of the Swiss." In 1815 a corps of Swiss guards was reorganized by Louis XVIII, but they were defeated and dispersed in the Revolution of 1830.

The Pope of Rome maintains a bodyguard of Swiss known as the Papal Guard, composed of picked men possessing the well-known Swiss qualities of courage, intelligence and fidelity.

An illustration of the *Lion of Lucerne* appears on page 3530 in these volumes.

**SWIT'ZERLAND,** a small republic of Western Europe, one of the most advanced democracies in the world, and one of the oldest republics. This little country, sometimes called "the playground of Europe," is far from being a playground to its sturdy inhabitants, who have established, in a land of many natural disadvantages, a prosperous and contented nation. Though it encompasses some of the loftiest peaks of Europe, Switzerland has an area of but 15,976 square miles, which is less than one-fourth the area of the New England states, or about half that of Maine. It has no seacoasts, being entirely surrounded by other nations. Germany and the Lake of Constance are on the north, Austria-Hungary and Liechtenstein on the east, Italy and Lake Geneva on the south and France on the west.

**General Features.** The snow-clad Alps and the Jura range cover about three-fourths of the whole land, making Switzerland the most mountainous country on the continent. The Alps extend over the southern and central sections, and the Jura Mountains form a great curve in the northwestern part. Between these two mountain masses is an elevated plain where the majority of the people find habitation.

In the Swiss Juras there are no very lofty elevations, the highest summit, the Dôle, being a little over a mile above the sea, but their glacier-robed sister ranges send up many towering peaks, culminating in Monte Rosa (15,217). Mount Saint Gotthard is the center of the great Alpine ranges, whose splendid scenery has attracted visitors from all over the world.

**Waters.** Four of the important rivers of Europe make their way through Switzerland, draining into three different seas. The Rhine, made up of the Vorder-Rhine and Hinter-Rhine, flows into the North Sea. The Rhone rises in the great Rhone Glacier, receives various mountain streams, widens into Lake Geneva and flows finally into the Mediterranean. The Ticino, through the Po, drains into the Adriatic, an arm of the Mediterranean. The Inn drains into the Danube and into the Black Sea.

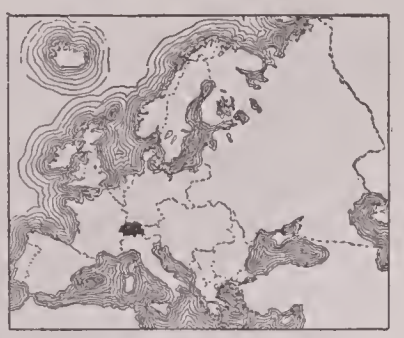
Besides its rivers, Switzerland has many lakes, and these are famous for the grandeur of their scenery. The two largest, Geneva and Constance, are at the southwest and northeast corners of the country, on the borders of France and Germany, respectively. On the shores of Lake Geneva stands the Castle of Chillon, made famous by the poet Byron in his *Prisoner of Chillon* (see illustration, page 1339). Around Lake Lucerne, in the west-central part of Switzerland, lived the men who laid the foundations of Swiss freedom. The Lake of Thun, southwest of Lucerne, is another very beautiful Swiss lake. On the south, between Italy and Switzerland, are Lake Maggiore and Lake Lugano. Lake Neuchâtel, the largest wholly in the country, is in the extreme west. The Rhine basin contains nineteen large, and thirty-seven small, lakes, and there are numerous Alpine tarns.

The melting of the snow in the mountains causes many mountain torrents which, milky-white in color, rush down to the valleys. Switzerland is noted, too, for its waterfalls. The highest of these is Staubbach, in the Lauterbrunnen valley, a lovely veil-like cascade which falls over a thousand feet. The Handeck, near the source of the Aar, falls 225 feet, and the Pissevache, in the Rhone valley, 200 feet. The Reichenbach descends in seven falls and the Grissbach in thirteen. The falls of the Rhine at Schaffhausen are only eighty-two feet in height, but an enormous mass of water descends.

**People.** In the racial characteristics of its people, Switzerland reveals two sharply contrasting strains—the Celtic and the Teutonic. In this country there are only thirty Celts to

every seventy Teutons, and the Celts are further weakened by being separated into three divisions—the Gallic, Italian and Romansh. Of these three divisions the Gallic speak French, the Italian speak Italian, and the Romansh their own language, a sort of rustic Latin, which is slowly dying out. The use of French, Italian and German, on the other hand, grows with the increase of the population. Indeed, German is spoken in every canton, although it predominates in the northern cantons and in Zurich, Bern and Lucerne. French is the prevailing tongue in Neuchâtel, Geneva, Valais, Vaud and Fribourg.

A glance at the map will show that the races have followed their natural divisions in the settling of the country, and that in the north Teutonic names predominate, while the Celtic cantons touch the French and Italian borders of the country. There are two exceptions to the general rule regarding racial predominances in population. One exception is in the Rhone valley, the other near the Rhine. These exceptions are caused by the nature of the mountain barriers which divide Switzerland from its neighbors. Five passes give Germany access to the Upper Rhone, while the French have but one. On the other hand, Germany has no easy access through the mountains to the Rhine, while on the southern bank there are many easy paths into the Italian valleys. As a consequence the upper waters of the Rhone are possessed by the Teutonic race and the Upper Rhine by the Celtic. But, generally speaking, the Teutonic cantons are found in the northern, and the Italian and French in the southern, half of the country. According to the census of 1910 the whole population was 3,741,971. In 1913 it was estimated to be 3,877,210. The chief cities are Zurich, Basel, Geneva, Bern and Lausanne.

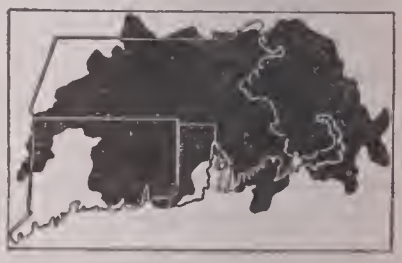


LOCATION MAP
The only country of Europe except Serbia which is entirely landlocked.

The religious divisions of Switzerland follow the lines of its racial settlement, and the northern cantons are largely Protestant. The Lutheran and Calvinistic sects predominate in these sections. In the southern cantons the people are for the greater part Roman Catholics, and the farther south one travels the more frequently appear the great wooden crucifixes at turns in the road, or sheltered shrines to the Madonna on lonely mountain pathways.

Naturally, this old amalgamation of races, as well as the great variations in the nature of the surface of the land itself, does not tend to make a wholly united people with similar national characteristics. As has been said by one of its own people, Switzerland has nominally twenty-two states, but actually five hundred states, or communes, each with its own local life and customs and independent claims. There is, however, a Swiss character which the world recognizes as such. Coupled with an enthusiasm for liberty is the plain, practical good sense that enabled the Swiss to work out a stable form of government.

With the movement which gave Switzerland its freedom from Austria, the peasants on the mountain sides, wresting a bare living from their "alps," or mountain pastures, had little to do. They were benumbed spiritually and intellectually by the intense hardship of their lives, and were unthinking, subservient vassals to the overlord who ruled them. It was the pastoral life about the shores of Lake Lucerne which produced a race of men able to organize a peasant army and lead it to victory against the army of an empire. Even to-day the peasants who inhabit the highland villages have continually a severe struggle to gain a livelihood. They have not only the nature of the ground and the long, cold winters to contend with, but are in constant danger from avalanches which may wipe out whole communities within a few minutes. Yet these Swiss men and women accept their fate with stoical fortitude, and refuse to move away from the farms which their forefathers have possessed for generations.



COMPARATIVE AREAS
Switzerland is about as large as Massachusetts, Connecticut and two Rhode Islands.

In the valley of the Vorder-Rhine grain is cultivated at the highest known elevation in Europe. This is near the village of Tschamut, 5,400 feet above the level of the sea. The grain is rye, and the growing season is so short that the peasants have erected a rude but ingenious drying apparatus in the fields, so they will not have to depend upon the inconstant sun to dry their harvests. But there are many

communities which do not depend even upon rye, but gain their entire subsistence from the alps, or mountain pastures, where they feed their cattle during the short summer months. In the highest of these communities snow commonly falls in June and the cultivation of corn is impossible. Even a few patches of potatoes are ripened only with difficulty. Though the peasants are nominally owners of their lands, these are always mortgaged, and a landowner is usually paying interest on loans contracted by his father.

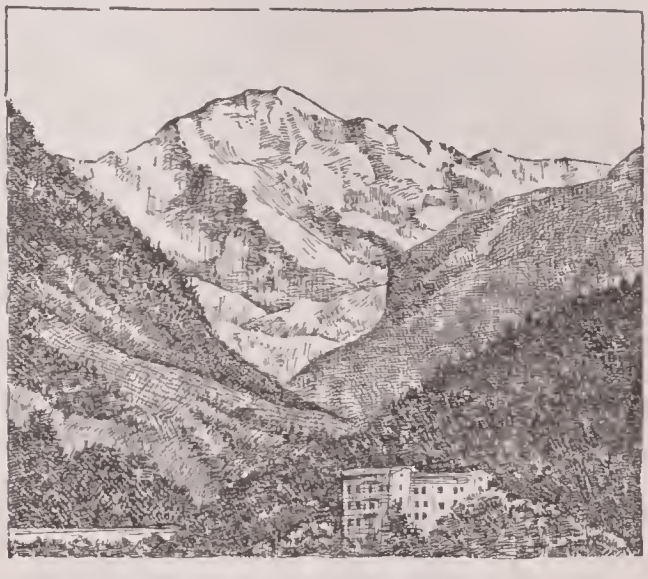
Naturally, these simple people, shut off from the world, with only arduous toil in their lives, know little of what goes on at the other side of their mountains. The women work in the fields with the men; the boys and girls receive only a simple schooling from the village priest, but are early schooled in unceasing labor. In all such villages which are of the Roman Catholic faith quaint little images are set up to invoke the aid of the saint against the terrors of avalanche and glacier. In many places earthworks and ridges of stone have been built to divert the direction of the avalanche from the community, should it by chance descend upon them.

The Swiss guides form a class which interests travelers. These men offer their services as guides for mountain climbers. They are hardy and brave, and at the same time are extremely cautious. This occupation, like that of the peasants, is handed down from father to son, so a climbing party may have among its guides "old Peter" and "young Peter," both experienced mountaineers.

**Climate, Plant and Animal Life.** The variations in altitude in Switzerland cause corresponding variations in climate and in the character of the vegetable life. In the valleys and on the lower mountain slopes olives, beeches, oaks, pines and firs grow. Higher up are the mountain pastures and rhododendrons, and above them come the eternal snows. On the central plain there is an average annual rainfall of thirty-three inches, but in the higher regions the precipitation is much greater. The most remarkable prevailing wind is a hot, dry southwest or south wind called the *föhn,* which occurs most frequently in spring. On the whole, the climate is healthful, though not particularly favorable to agriculture.

Game is no longer abundant in Switzerland, though the chamois and ibex are still found high up the mountains. The chief game birds are grouse, partridge and snipe.

**Production and Industries.** Over one-fourth of the total area of Switzerland is nonproductive; of the productive area over thirty-five per cent is grass and pasture land, and twenty-nine per cent forested country. The Swiss successfully cultivate rye, oats and potatoes, and nuts, olives and grapes are produced in favorable places along the lakes and on the southern slopes of the mountains, but the great



THE JUNGFRAU

One of the famous peaks of the world, and generally regarded as Switzerland's most beautiful mountain. It rises over two and a half miles above sea level.

proportion of the food supplies of the country must be imported. By far the most important agricultural products are cheese and condensed milk. Cattle lead in number and importance among the domestic animals, and goats, reared for their milk, skins and flesh, come next in order. The lakes are important fishing grounds.

Though hampered by a scarcity of coal and iron, the Swiss have made remarkable progress in manufacturing. Their cotton fabrics are known the world over for their excellent quality, and their machine-made laces and embroideries are likewise famous. Silk ribbons made by the Swiss are among the best to be had, and Swiss watches, jewelry and music boxes find their way into the markets of all the world. Wood carving, straw plaiting and the manufacture of leather goods, woolen goods and machinery are also important. The chief manufacturing cantons are Zurich, Glarus, Saint Gall, Appenzell, Neuchâtel, Basel and Geneva.

The discovery that tuberculosis could be cured in dry, cold, clear air, as well as in a southern climate, is one of the factors in the development of Switzerland as a health resort. Sanitariums have been built at several points, and the hot springs and salt and mineral baths

in Bern, Baden and Schaffhausen draw numerous travelers to those places. Lured by the magnificent scenery, many tourists go annually to Switzerland, thus increasing its prosperity.

**Transportation.** Switzerland has practically no navigable rivers, as the streams have very rapid currents, but there are about 3,530 miles of railway in the republic. There are five main railroad systems, all owned and operated by the national government. There is also a network of carriage roads, and these are kept in admirable condition.

**Government.** Switzerland is a confederation of twenty-two cantons, three of which, Basel, Appenzell and Unterwalden, are politically divided into two half-cantons each. Four are called Forest Cantons, namely Schwyz, Uri, Unterwalden and Lucerne. They are grouped about Lake Lucerne. As Schwyz was the most prominent in the war for freedom, and members of the confederacy for independence were known to the outside world as Switzers, this canton ultimately gave its name to the entire league. Each canton has its own constitution and local government, and is divided for administrative purposes into districts. The districts are in turn divided into communes. In nearly all of the cantons the principle of the initiative and the referendum is successfully applied. The Swiss cantons are republics in miniature, having extensive powers in local affairs.

The capital of the Swiss confederation is Bern. The executive power is vested in a Federal Council of seven members elected for a term of three years by the two houses of the Federal Legislature, or Assembly. There are seven departments of administration, each department being under the control of one member of the Council. The president of the Council, chosen by the Council members for a term of one year, is also President of the confederation. The relations of the Council to the Legislature are somewhat the same as those of the Cabinet of Great Britain to Parliament.

The two houses of the Legislature are the National Council and the Council of Estates, the Swiss names for these bodies being *Nationalrat* and *Ständerat*. The Council of Estates is composed of two members from each canton, whose terms vary from one to four years. Each canton regulates the tenure of office, salary and qualifications of its own representatives. The National Council is made up of members chosen for three-year terms by direct universal suffrage, the membership being apportioned on the basis of one deputy to every 20,000 souls. By virtue of the initiative and referendum, the people may draw up and present to the Legislature measures they wish to have enacted into law.

**Defense.** The Swiss military system, embodying the principle of universal liability to service, is famous. Instead of a standing army, there is a national militia of the republic, composed of its male citizens, who are trained to defend the country against invasion. All males between the ages of twenty and forty-eight are liable to military service, with the exception of certain Federal employees, clergymen, teachers and policemen, and those who are disqualified for physical reasons. The excused or rejected must pay certain special taxes. The first twelve years are spent in the first line, or *Auszug,* the following eight in the *Landwehr,* and the next eight in the *Landsturm.* (Cavalrymen serve eleven years in the Auszug and twelve in the Landwehr.) During their first year in the service the men are trained in special recruit schools, and at the end of the term each one takes home his equipment and arms. These he must keep in good condition. After the first year men in the first line are called out six times for about two weeks of service. In the Landwehr they are called out but once, and then for a period of eleven days. Each man must report to the military authorities every year in which he is not in active service. The Landsturm consists only of men who have undergone some training. The unarmed Landsturm comprises all other men between the ages of twenty and fifty who can be used for various kinds of noncombatant duties.

**Education.** Elementary education is obligatory in all of the cantons, but the law is most rigidly enforced in the Protestant communities. The percentage of illiteracy among men eligible for military service is very low, only one out of one thousand being unable to read. There are seven universities in the country, at Basel, Zurich, Bern, Geneva, Lausanne, Fribourg and Neuchâtel. The Federal government maintains a polytechnic school at Zurich.

**History.** The country in Roman times was the home of the Helvetians and the Rhaetians, who at different times were conquered by Roman armies. During the German invasions Switzerland was occupied by the Alemanni and the Burgundians, and eventually the whole country became a part of the empire of the Franks. In the eleventh century it came under the rule of the German emperors, and so be-

# SWITZERLAND

Mountain Climbing

Swiss Arms

The Swiss Peasants Live in Surroundings Such as These

came a part of the Holy Roman Empire. Late in the thirteenth century the House of Hapsburg, the imperial dynasty of Austria, became very powerful in the country. The tyranny of the Austrian rulers led to the formation, in 1291, of a league of three Forest Cantons—Uri, Schwyz and Unterwalden. These cantons entered into a perpetual alliance to resist Austrian oppression, and this union was the first step in the war for Swiss independence.

The annals of this period abound in tales of heroism. Typical of the spirit of the time, though perhaps not historically accurate, is the story of William Tell. In 1315 the first blow for liberty was struck when the confederation decisively defeated the Austrians at the Battle of Morgarten. This victory gave the Swiss seventy years of peace.

Meantime Lucerne, Zurich (center of a powerful coalition), Glarus, Zug and Bern joined the confederation, and the united cantons were able to present a strong front against the Austrians when war was renewed in 1386. At Sempach (1386), where Arnold Winkelried "made way for liberty and died," and at Näfels (1388) the Swiss were completely victorious, and Austrian power was permanently weakened.

In 1415 the cantons began offensive warfare, compelling Austria to reliquish Aargau, and about half a century later they added Thurgau to their country. Then followed a war with Charles the Bold of Burgundy, in which the Swiss were again victorious. In 1481 the confederation was strengthened by the addition of the towns of Fribourg and Solothurn. Seventeen years later (1498) the Emperor Maximilian I began a war to place the Swiss again under the rule of the Empire, but the cantons held their ground in six desperate battles. Though they were practically independent from this time on, their independence was not formally recognized until 1648, when the Peace of Westphalia was ratified. In 1501 Basel and Schaffhausen came into the confederation, and in 1513 Appenzell was admitted.

The Protestant Reformation, which began in Germany in this period, soon made itself felt in Switzerland, and the cantons were involved in religious wars in the sixteenth century. Through the influence of Zwingli and of Calvin, the latter of whom made Geneva his headquarters, Protestant doctrines spread rapidly through the country; difficulties between opposing factions were partially adjusted by the Peace of Westphalia, which closed the Thirty Years' War.

During the remainder of the seventeenth century and for many years thereafter Switzerland was torn by political and religious disorders, and in 1798 a short-lived Helvetic republic was founded to take the place of the old confederation. In 1803 a new confederation of nineteen cantons was organized by Napoleon, and for a time peace and order prevailed. When the affairs of troubled Europe were settled in 1814-1815 by the Congress of Vienna, the powers acknowledged the independence of Switzerland and guaranteed its perpetual neutrality. A confederation of twenty-two cantons was organized (three being divided into half-cantons). It was not until 1848, however, that a really efficient form of government was established. In 1874 the constitution was revised, and more extensive powers were granted the central government.

Since that date Switzerland has made rapid progress. During the War of the Nations the country maintained its neutrality successfully, though often under great difficulties. The Swiss embassy took charge of American interests with respect to Germany when the United States severed diplomatic relations with the Imperial German government. B.M.W.

Consult Story's *Swiss Life in Town and Country;* Wade's *Our Little Swiss Cousins;* Crawford's *Switzerland of To-day.*

**Related Subjects.** The following articles in these volumes will give added details as to the geography and life of Switzerland:

CITIES

Altdorf
Basel
Bern
Geneva
Interlaken
Lausanne
Lucerne, subhead under *Lucerne, Lake of*
Neuchâtel
Zurich

HISTORY

Calvin, John
Helvetii
Holy Roman Empire
Reformation
Tell, William
Thirty Years' War
Winkelried, Arnold
Zwingli, Ulrich

LAKES

Constance, Lake
Geneva, Lake
Lucerne, Lake of
Lugano, Lake of
Maggiore, Lake
Neuchâtel, subhead *Lake of Neuchâtel*

MOUNTAINS

Alps
Jungfrau
Matterhorn
Mont Blanc
Monte Rosa
Saint Gotthard

RIVERS

Rhine
Rhone

UNCLASSIFIED

Avalanche
Chillon
Glacier
Mer de Glace
Saint Bernard, Great
Simplon

# *OUTLINE AND QUESTIONS ON SWITZERLAND*

## *Outline*

**I. Location**

(1) Latitude, 45° 49′ 2″ to 47° 48′ 32″ north
(2) Longitude, 5° 57′ 26″ to 10° 29′ 40″ east
(3) Relation to other countries
(4) Absence of seacoast

**II. Size**

(1) Actual area, 15,976 square miles
(2) Area compared with that of states and other countries

**III. Geographic Features**

(1) Most mountainous country in Europe
(2) Rivers
(3) Lakes
(4) Climate
(5) Plant and animal life

**IV. The People**

(1) Population
(2) Chief cities
(3) Racial strains
(4) Dominant characteristics
(5) Division according to religion
(6) Struggle for livelihood
(7) Education

**V. Industries and Resources**

(1) Agriculture
  (a) Adverse conditions
  (b) Highest known elevations in Europe where grain is grown
  (c) Chief crops
  (d) Stock raising and dairying
(2) Manufactures
(3) Scenery and climate as resources
(4) Transportation

**VI. Government and History**

(1) Confederation
(2) Defense
  (a) Universal liability to military service

**VII. History**

(1) The early days
(2) Under the Holy Roman Empire
(3) Under the House of Hapsburg
(4) The struggle for independence
(5) The Reformation
(6) The period of internal troubles
(7) Establishment of a stable government
(8) Switzerland and the War of the Nations

## *Questions*

How many languages are spoken in this little country? Which of these are spreading?

What is the drop of the highest of Swiss waterfalls? How does this compare with the drop of Niagara?

What famous poem celebrates a castle in Switzerland? Where is this castle located?

Why would you not be likely to have as your guide in mountain climbing the son of a Swiss peasant farmer?

Where is the highest elevation on the continent where grain is raised? To what measures do the farmers have to resort to dry their crops? Why?

Who "made way for liberty, and died," and how did he do it? Name another famous Swiss patriot and tell what he did.

What is the tallest mountain entirely within Switzerland?

What difficulties do the mountain peasants meet? What constant danger do they face?

What special part did the three Forest Cantons play in the history of the country?

In what sense may this little country be said to have five hundred states?

In what sense may Switzerland be called the "playground of Europe," and in what sense is that name wrongly applied?

**SWORD,** *sohrd,* one of the most ancient of all weapons of offense and defense. The origin of this weapon is lost in remote antiquity. As soon as the art of working metals was discovered the ingenuity of man was turned towards the manufacture of destructive weapons. The earliest forms of swords of which authentic information is available were those of the Assyrians, Gauls and Greeks. The swords used by these people were made of bronze, and were short, two-edged weapons. The Roman sword, a terrible weapon in the hands of trained legionaries, was of steel, short and straight, with a sharpened point and two cutting edges.

The invention of gunpowder, which caused defensive armor to be discarded, had the effect of lightening swords, as a heavy blow was no longer necessary. The light rapier, which became the recognized dueling weapon, would not resist the blow of a heavy sword, yet against opponents similarly armed was an effective and deadly weapon. High art was exercised in the tempering of rapier blades, Toledo, Spain, becoming famous for the fine quality of its product. The favorite weapon of the East was the scimitar, a blade with a pronounced curve. Damascus was noted for its scimitar blades. The long sword of the Japanese is thirty to thirty-six inches in length, with a heavy, one-edged blade and a round hand guard. The samurai of old carried a second sword, about half the length of the long sword.

The swords of modern armies are more or less alike, differing only in minor details of weight and length. The French cavalryman carries a straight sword with a blade thirty-six inches in length, weighing two pounds six ounces. The German cavalry sword is heavier, weighing two pounds eight and one-half ounces, with a length of thirty-two and one-half inches. The British cavalryman carries a sword thirty-five and one-eighth inches long, weighing two pounds thirteen and one-half ounces. In the United States army the sword proper has given place to the saber, which is designed for both cutting and thrusting and is thirty, thirty-two and thirty-four inches in length.

The sword has been a favorite figure of speech to denote strife and conflict since man first began to regard the growth of civilization. "He that liveth by the sword shall perish by the sword" has a lesson for civil life as truly as for the military. The Hebrew prophets sought to have the swords of the nation turned into plowshares, while the New Testament speaks of the "sword of the Spirit."

**The Sword in Modern War.** At the commencement of the War of the Nations in 1914 the old controversy between lance and sword was revived. Many noted leaders of cavalry declared the lance to be the only effective weapon for cavalry, while others defended the sword as superior both for offense and defense. Experience proved, however, that there was little opportunity for use of the sword in that war. There was practically no cavalry action, and the best weapon for the intrepid charge was the bayonet, which all soldiers were taught to use with deadly precision. F.ST.A.

**SWORDFISH,** *sohrd' fish,* a species of ocean fish having a long, flattened upper jaw that resembles the weapon from which it derives its name. The swordfish is allied to the mackerels. Though found most commonly in the Atlantic Ocean, it occurs also in the Pacific, and occasionally is seen in the neighborhood of the Santa Barbara Islands, Southern California. The average length of a swordfish is seven feet, and the weight is about 250 pounds, but larger specimens have been caught which weigh 600 or 800 pounds.

Their "swords," sharp-edged and strong, and half as long as the body, are powerful weapons, capable of driving into the side of any sailboat or rowboat. Fishermen enjoy capturing these fish because they are such game fighters. Off the New England coast from 3,000 to 6,000 are caught a year, chiefly by harpooning. The flesh is coarse, but it has a good flavor. Swordfish prey upon menhaden, herring, mackerel and other fish that travel in schools. These they kill by striking out to the left and right with their swords.

**SYCAMORE,** *sik' a mohr,* an attractive shade tree of the plane tree family, whose hard, reddish-brown wood is used in making furniture and various kinds of woodwork. It is found abundantly in fertile bottom lands and along streams, and is distributed from Southern Maine to the north shore of Lake Ontario, west to Minnesota and Nebraska, and as far south as Texas and Florida. This tree grows from seventy-five to one hundred and fifty feet high. On

SYCAMORE LEAF AND SEED POD

the lower trunk its bark is a dark reddish-brown and on the limbs an olive-green. The bark on the branches breaks off in small scales, exposing an inner bark of light color and giving an effect expressed in the familiar phrase—"hoary antlered sycamore."

The broad leaves, which furnish delightful shade, are yellow-green with a pale lining, and have irregularly-cut margins and prominent veins. There are two kinds of flowers, those bearing stamens and those bearing pistils. The former are a deep red and the latter a pale green with a tinge of red. They open in May, when the leaves unfold. The fruit of the sycamore is a dry seed ball, which hangs from a flexible stem. Other names for this tree are *buttonwood* and *American plane tree.*

**SYDENHAM,** *sid'en am,* Charles Edward Poulett Thomson, First Baron (1799-1841), a British statesman and colonial administrator, Governor-General of Canada from 1839 to 1841. After a distinguished career in England he was sent to Canada to bring about the legislative union of Upper and Lower Canada, a duty which he fulfilled with very general satisfaction. As a reward, in 1840 he was created Baron Sydenham of Kent and Toronto, but lived only a year to enjoy this new honor, for he died at Kingston, Ont., in September, 1841, as the result of an accident.

Sydenham, or Poulett Thomson as he was better known, was born at Wimbledon, Surrey, England. From 1815 to 1817, and again from 1821 to 1823, he was in Petrograd on business for his father, a London merchant, and in 1823 he became associated with the London office. Before long, however, his Liberal connections drew him into politics. In 1826 he was elected to the House of Commons, in 1830 he entered Earl Grey's Cabinet as Vice-President of the Board of Trade, and in 1834 became President. During these years he was conspicuous as a reformer along economic lines; tariff laws tending toward free trade, banking and factory legislation, the abolition of usury laws, and commercial treaties with foreign countries were some of the many subjects which showed the marks of his work. Ill health compelled his resignation from Parliament in 1839. His sudden death came before he had developed his powers to the full, but not before he had made a place for himself in history.

**SYDNEY,** next to Halifax the second incorporated city and one of the larger communities in Nova Scotia. It is situated on the northeast coast of Cape Breton Island, and is the terminus of the Sydney & Louisburg Railway and of the eastern division of the Intercolonial Railway. An electric line runs to Glace Bay and Dominion, and there is regular steamship connection with all important Canadian Atlantic ports. North Sydney and Sydney Mine are on the opposite side of the harbor. Sydney is 276 miles from Halifax, 728 miles from Montreal and 2,240 miles from Liverpool, England. Population in 1911, 17,723; in 1916, estimated, 23,000.

Sydney is noted for its coal trade and for its extensive production of iron and steel. It is the commercial center, both for wholesale and retail trade, of the great coal field in Canada. The occurrence of iron ore in proximity to coal has made Sydney a manufacturing center as well, with an annual output which is now over $10,000,000 a year. The plant of the Dominion Iron & Steel Company, which cost $35,000,000 and employs 4,000 men, is the greatest industrial establishment, and among the smaller plants worthy of mention are mills and factories for the production of tar, roofing materials, pressed brick, iron castings, sheet metal, structural steel, boats and cigars. In the vicinity are found silica, gypsum, fire clay and marble, and there is also considerable timber, chiefly spruce, fir and hemlock. The city owns its water and sewerage systems, but a private company provides electric light. A.H.M.

**SYDNEY,** *sid'ni,* the oldest city and the chief naval station of Australia, and next to Melbourne the most important British commercial center in the southern hemisphere. It is the capital of New South Wales and occupies a beautiful site on the southern shore of Port Jackson (see map of Australia, following page 488). Sydney lies about eight miles from the entrance to the vast harbor, which is defended by several forts and batteries and is so large it is capable of sheltering all of the navies of the world. The older section of the municipality is rapidly being replaced by the streets and buildings of a fine, modern city, worthy to be compared with the capital cities of Europe and America.

The most notable structure is the building of the University of Sydney, which stands on a picturesque height in Victoria Park. It is built of sandstone, in fifteenth-century Gothic style; grouped about it are three affiliated denominational colleges. Among the fine churches are Saint Mary's Cathedral (Roman Catholic) and the Anglican Cathedral of Saint Andrew. Other important edifices are the town hall, con-

taining one of the finest organs in the world; a handsome post office in Renaissance style; and the Parliament houses and other government buildings. Sydney possesses several beautiful parks, the finest botanical gardens in Australia, the National Art Gallery, a large number of learned, educational and charitable institutions, and one of the three mints of the Commonwealth.

Local transportation is provided by an excellent system of electric tramways, owned by the government of New South Wales. The waterworks and slaughterhouses are under city control. The city is a center for the manufacture of wagons, glass, pottery, stoves, liquor, boots and shoes and other commodities. There are twenty-three miles of wharves and quays and several dry and floating docks. In 1911 the population was 112,921; including suburbs, 636,353; in 1917 it was estimated to be very close to 752,500.

**SYDNEY MINES,** a town in Nova Scotia, on the northeast coast of Cape Breton Island. It is in Cape Breton County, three miles north of North Sydney and eighteen miles northwest of Sydney, and is connected with these towns by the Intercolonial Railway. The Nova Scotia Steel & Coal Company also operates a railway to North Sydney. Sydney Mines is one of Nova Scotia's greatest coal-mining towns, the annual output being about a million tons. Between 3,500 and 4,000 men are constantly employed in the collieries. There are also several large, open-hearth, steel furnaces, foundries and machine shops, a blast furnace and a steel compression plant. The manufactures of the town are worth approximately $3,000,000 a year. Population in 1911, 7,470.

**SYMBOL,** *sim'bol,* a sign by which one knows or recognizes an object or an idea. In one sense all words are symbols. Spoken words are the symbols for objects and ideas. The letters of the alphabet are symbols for particular sounds, and these symbols are combined to form the written words which are the symbols for spoken words.

One of the most conspicuous and familiar symbols is the flag. To every person the flag of his nation means "my country." Colors have a recognized and almost universal symbolism, and so have animals. Black is almost universally the symbol of grief; white, of innocence; blue stands for sincerity and purple for royalty. A lion is the symbol of courage; a lamb of meekness; the dove and the olive branch, of peace.

Every religion has symbols, particularly pictured ones. In all ages since the crucifixion of Christ the Cross has been the recognized symbol of Christianity throughout the civilized world. The ship was an early Christian symbol which represented the Church, in which "the faithful are carried over the sea of life." The gospel writers are represented by symbols; the winged man is Saint Matthew; the winged lion is Saint Mark, the winged ox is Saint Luke and the eagle is Saint John. Other saints carry symbolic emblems by which they may be recognized—Saint Mary by a box or vase (for ointment), Saint Paul by a sword, Saint Andrew by a cross.

In mythology there are innumerable symbols, such as the trident, which is the symbol of Neptune; the peacock, of Juno; and the mirror or apple, of Venus. Neptune's trident is used in astronomy to designate the planet which bears his name. Another pictured symbol is the skull and crossbones which, according to the law, must be placed on all bottles and boxes containing poison, to represent deadly peril. It was once the emblem on the flag flying from the mast of pirate ships, white on a black ground; then, as now, it symbolized death.

All of the sciences—mathematics, chemistry, astronomy, botany and biology—have a special set of symbols for representing the different objects, elements and operations involved, which are used in place of language. Some of the symbols in astronomy are so ancient that their origin is unknown. The symbols for the principal heavenly bodies are:

| | |
|---|---|
| Sun ☉ | Mercury ☿ |
| Venus ♀ | Earth ♁ and ⊕ |
| Moon ☽ | Mars ♂ |
| Ceres ⚳ | Pallas ⚴ |
| Juno ⚵ | Vesta ⚶ |
| Jupiter ♃ | Saturn ♄ |
| Uranus ♅ | Neptune ♆ |

A star is represented thus, ✳.

The phases of the moon are indicated in this manner: ● new moon; ☽ moon in first quarter; ☺ full moon; ☾ moon in last quarter.

Mathematical symbols are numerous, and most of them are very familiar. First there are the symbols of value, the Arabic and Roman numerals, and the letters of the alphabet; then there are the symbols of operations, such as +, the sign of addition; —, of subtraction; ×, of multiplication; ÷, of division. The character $\pi$ (pi) stands for the number 3.1416, which is used in computing the area, circum-

ference and diameter of circles; *c* stands for circumference, *d* for diameter, *v* for volume, *a* for area.

In chemistry either the first or the first two letters of its English, Latin or German name is used to designate a metal or an element. *Hg* (from the Latin) is the symbol for mercury; *Fe* (also from the Latin) is the symbol for iron. *H* stands for hydrogen and *O* for oxygen. Such a symbol not only represents an element, but it also stands for a specific quantity of that element. *O* always means sixteen parts, by weight, of oxygen; *Fe* always means 56 parts, by weight, of iron. So a chemical formula may be constructed simply by putting down the letters of the elements composing the compound. Small numerals may be added to each letter to show exactly what proportion is needed. Thus, the formula for water is $H_2O$; $AgCl$ represents the composition of silver chloride; $Al_2(SO_4)_3$ that of aluminum sulphate (see the article CHEMISTRY, subhead *Elements*). A.C.

**SYNAGOGUE,** *sin'a gog,* a place of local worship among the Jews. Supposed to have originated at the time of the Babylonian Captivity (sixth century B.C.), it was in existence wherever the Jews had settled at the time of Jesus, and continues among them to the present day.

In New Testament times the synagogue was built at the cost of the community. It was so constructed that the worshiper, on entering or at prayer, faced in the direction of Jerusalem. The furniture included a chest, known as the holy ark, in which were kept the rolls of Scripture used in the service; a lamp that burned perpetually, symbolizing the presence of Jehovah; candlesticks for use on Sabbath and feast days; a rostrum for the reader and probably a desk on which to rest the roll; seats for the elders, in front of the ark and facing the people; and seats for the congregation, the men on one side and the women on the other, divided by a screen. The ruler of the synagogue was responsible for the service, and he chose those who should take part. The elders formed the lesser Sanhedrin, a body having civil and religious authority over local cases. They were examined by members of the great Sanhedrin, but were elected by the congregation.

**The Great Synagogue** was a body of 120 members, probably organized at the time of Ezra and Nehemiah to define and teach the Law. It is believed to have finally determined the Old Testament canon. At a later period it became merged with the Sanhedrin (which see).

**SYNDICALISM,** *sin'dik al iz'm,* a condition sought in the labor world by which the day laborer shall control all industry. Just the means to be employed are difficult to state, for among men who preach syndicalism and who aim to bring it to reality there is not unanimity of opinion. Syndicalists are not looking for success through the Socialists; they do not hope for results through politics, although many of them belong to the Socialist organization. They do not wish for ownership of industry by the state unless they are strong enough to control its policies, and of this they have no present hope. They have learned to expect nothing from legislative action which will strengthen their cause. They do not even look for support in their revolutionary plans from trade unionism collectively. Syndicalism must be worked out on lines peculiarly its own, for its supporters recognize the impossibility of winning the adherence of those who believe in the existing order; those who aim to advance the great cause of labor by working along lines which are even moderately conservative, denounce syndicalism. Its foremost advocates in America are the members of the Industrial Workers of the World, the most radical labor organization ever known.

The advocates of syndicalism have therefore adopted a policy not countenanced by legal standards. By harassing their employers, the capitalists, whom they look upon as their enemies, they hope to wear them down and force them through never-ending losses to lose interest in industrial life. It is proposed to accomplish this by boycotts, strikes, and particularly by sabotage. When the capitalists are weakened and in despair it is their purpose to inaugurate a vast strike and in one supreme effort overturn the present system and themselves take possession of all industry.

It is the hope of the syndicalists that the railway workers shall control all railroads, that miners shall control all mines, that factory workers shall run the factories, and so on through the whole industrial range. They demand all the benefits that accrue from labor. E.D.F.

Consult Brooks's *American Syndicalism*; Clay's *Syndicalism and Labour*.

**Related Subjects.** The following articles may be consulted in this connection:

Capital — Socialism
Labor Organizations — Strike
Sabotage

**SYNECDOCHE,** *sin ek'doh ke,* a figure of speech in which a part of a thing is used for the

whole, or the whole for a part. It may be considered a form of metonymy. The expression "a fleet of forty sails" contains an example of synecdoche, *sails* being used for *ships,* or a part for a whole.

**Related Subjects.** For purposes of comparison the following articles in these volumes may be consulted:

| | |
|---|---|
| Figure of Speech | Metonymy |
| Metaphor | Simile |

**SYNGE,** *sing,* JOHN MILLINGTON (1871-1909), an Irish dramatist, born at Rathfarnam, near Dublin. He was graduated from Trinity College, and later is said to have wandered over Europe, a silent, poverty-stricken man in ill health. During this period he picked up numberless stories and legends among the common people which he afterwards depicted so faithfully in his plays, which he began producing in 1903.

After the completion of *Aran Islands,* and the production of several short poems, he began to write plays, the prevailing note of which was sadness, whether they were comedies or tragedies. His work has been produced with success both in Europe and in America; all the completed dramas deal with Irish peasant life, of which he gives fearless, melancholy, tragic and humorous pictures. They include *The Playboy of the Western World, The Shadow of the Glen, The Tinker's Wedding, Riders to the Sea* and *The Well of the Saints.* He was in Dublin, working on *Deirdre of the Sorrows,* at the time of his death.

**SYNTAX,** *sin'taks,* a division of grammar that treats of the orderly arrangement of words to form sentences and the grammatical relations of words in the sentence. *Syn* is derived from a Greek word meaning *with* or *together,* and *tax* from a word meaning *to arrange,* and these two words combined constitute a term that signifies the drawing up of an army in battle array. *Syntax* is thus an appropriate term to describe the building up of sentences, which may be described as the marshaling of words to express thought.

The relation that any word bears to the other words in the sentence is known as its *syntax* or *construction,* and when an expression is used ungrammatically we say that such use is an error in syntax. The use of a singular verb with a plural subject, for instance, as *They was here,* is an error in syntax. In the study of grammar the student learns not only how to put words together to make sentences, but he learns how to take the sentences apart—to break them up into the elements of which they are composed. The first process is known as *synthesis,* and the second as *analysis.*

**Related Subjects.** The various phases of this subject are discussed in detail in the articles listed below. In the articles on the parts of speech full directions are given for parsing, and the special errors in syntax connected with each part of speech are pointed out. See:

| | |
|---|---|
| Adjective | Inflection |
| Adverb | Interjection |
| Analysis | Mode |
| Article | Noun |
| Case | Parsing |
| Comparison | Participle |
| Conjugation | Person |
| Conjunction | Preposition |
| Declension | Pronoun |
| Gender | Punctuation |
| Grammar, subhead | Sentence |
| *Sentence-Building* | Tense |
| Infinitive | Verb |

**SYRACUSE,** *seer'a kuse,* a small municipality of Sicily, occupying the site of one of the most powerful cities of the ancient Grecian world. Near the close of the eighth century B. C. a band of colonists from Corinth made a settlement on the small island of Ortygia, near the Sicilian shore. The colony developed into a rapidly-growing city that soon spread over to the main island, which was connected with the islet by a causeway.

Ancient Syracuse had a long and eventful history. In the fourth century B. C., under the rule of Dionysius the Elder (which see), it became a center of Greek art and culture, and won renown because of a victorious war with Carthage. In 212 B. C., however, the city was captured by the Romans, whose fleet had been set on fire by the burning glasses of the famous mathematician Archimedes (which see). Thereafter the city gradually declined, being reduced finally to its ancient limits. Ortygia, the present site, is now a peninsula.

Modern Syracuse is the capital of a province of the same name, and has a population of about 27,000. It is interesting chiefly because of its ruins—monuments of past glory. Some Doric columns of antiquity may be seen in a cathedral erected about the ruins of a temple. The fountain of Arethusa, famed in legend, is in the southern part of Syracuse. See ARETHUSA.

**SYRACUSE,** N. Y., the county seat of Onondaga County, situated in the central part of the state, at the junction of the Erie and Oswego canals (see NEW YORK STATE BARGE CANAL), thirty-seven miles southeast of Oswego, 148 miles west of Albany, the state capital, and

150 miles east of Buffalo. Various branches of the New York Central and the Delaware, Lackawanna & Western railways enter the city. Through the Erie Canal, which pierces the city from east to west, there is water communication with the Hudson River and Lake Erie, and through the Oswego Canal, with Lake Ontario and the Saint Lawrence River. Six interurban lines operating from the city afford additional passenger and freight service. The population increased from 137,249 in 1910 to 155,624 in 1916 (Federal estimate), and the city ranks fourth in size in the state. The area exceeds seventeen square miles.

Syracuse is built largely on silt brought down from the Onondaga Valley, and the profuse growths of trees and shrubbery give the broad streets of the residential district a parklike appearance. The recreation grounds of the city cover about 300 acres; the largest of these is Burnet Park (123 acres). There are several squares in the city, Clinton Square and the one facing the county courthouse being especially attractive. Syracuse is the home of the state fair, which is held under the auspices of the State Agricultural Society. The Onondaga Indian Reservation is south of the city.

**Buildings and Institutions.** Onondaga limestone, found in immense quantities in the vicinity, is largely used in building, and the city has many examples of modern architecture. Noteworthy structures are the Federal building, the city hall, the courthouse, the state armory and a number of fine bank and office buildings. The most notable institution for advanced learning is the Syracuse University (which see), founded in 1870. Other institutions are Travis Preparatory School, Saint John's Academy (Roman Catholic), Saint John's Military School (Episcopal) and a Carnegie Library containing 150,000 volumes. The Court of Appeals Law Library, which belongs to the state, has over 35,000 volumes. There are also a Museum of Fine Arts and the Onondaga Historical Society. Syracuse is the see of a Roman Catholic bishop. Of the eighty churches in the city the First Presbyterian is the most noted. The benevolent institutions include the Good Shepherd, Saint Mary's and Saint Joseph's hospitals, a home for aged women, orphan asylums and a state institution for feeble-minded children. The Onondaga Penitentiary is at Jamesville, five miles southeast of Syracuse.

**Commerce and Industry.** Formerly the production of salt was the leading industry of Syracuse, and it maintained more than half of the population. Of late years Warsaw, N. Y., and Manistee, Mich., have taken the lead in salt production, and the Syracuse industry is of secondary importance. One of the leading manufacturing establishments is the factory of the Solvay Process Company, where about 3,000 men are employed in making soda ash, bicarbonate of soda, caustic soda, tar, ammonia, carbolic acid, picric acid and coal-tar products. The brine used by this company is brought through iron pipes from wells twenty miles south of the city. This plant is probably the largest of its kind in the world. The city is an important center for the manufacture of automobiles, agricultural implements, clothing, furniture and chinaware. About 15,000 people are engaged in the metal works, about 5,000 in the manufacture of chemicals and about 5,000 in the textile and clothing factories. The export trade is large.

**History.** The territory around Syracuse was formerly owned by the Onondaga Indians. In 1778 the state bought, by treaty, a large tract of land which contained the salt springs, and formed what was known as the Onondaga Salt Springs Reservation. The settlement of the city began in 1805, and it was known as South Salina, Bogardus' Corners, Cossitt's Corners and Milan, until it was named Syracuse, for the ancient city in Sicily. In 1825 it became a village; in 1847 it annexed Salina and was chartered as a city. Its area was enlarged by annexation in 1887 and again in 1892.

**SYRACUSE UNIVERSITY,** a coeducational institution under the direction of the Methodist Episcopal Church, founded at Syracuse, N. Y., in 1870. It has a number of imposing buildings, and its campus of nearly 100 acres is on an elevation commanding a superb view. The university includes the college of liberal arts, the college of fine arts, the college of medicine (successor to the Geneva Medical College), the college of law and the college of applied science, the teachers' college, the college of agriculture and the New York School of Forestry. There are also maintained a school of oratory, a library school, a school of photography and a summer school. The university athletic field covers five acres; on it is one of the finest stadiums in the United States, with a seating capacity of 20,000. The library of over 99,000 volumes includes that of the noted German historian, Leopold von Ranke, which was purchased in 1887. The faculty numbers about 315, and the student enrolment is over 4,000.

**SYR-DARYA,** or **SIR-DARIA,** *sir dahr'i ah,* the principal river of the province of Syr-Darya, in Russian Turkestan. It begins as a small mountain stream whose source is on the northern slope of the Tian-shan range. Flowing in a general northwesterly direction, the Syr-Darya follows a course of about 1,700 miles, finding its outlet in Lake Aral (see map of Asia, opposite page 417). For a long distance the stream flows through an arid plain, where its volume is decreased by evaporation and the drawing off of water for irrigation purposes. It is of little value for navigation.

**SYRIA,** *seer'i a,* a region in Asia Minor bordering on the eastern shore of the Mediterranean Sea. This land has no very important part in modern commerce and industry, and it is of little significance politically, but the name has associated with it scenes and events of imperishable fame; for the land of Syria includes the Holy Land, the birthplace of Christianity, and it was in this region that the Israelites established themselves as a nation.

Modern Syria occupies a narrow strip of country whose boundaries are approximately the same as in Bible times—the Alma Dagh range on the north, the Euphrates River and Syrian Desert of Arabia on the east, the Great Sea on the west and Egypt on the south. It constitutes a Turkish vilayet (province), and has an area of 114,530 square miles. The vilayet is divided into six local governments, Aleppo, Zor, Syria, Beirut, Jerusalem and Lebanon. An official estimate gives the number of inhabitants as 3,675,100. Of these, Mohammedans are in greatest number, but there are many Christians of the Orthodox Greek Church, especially in Lebanon. Wandering Bedouins and Arabs are found in the south, and Palestine is a Jewish center. Damascus, Aleppo, Beirut and Jerusalem are the principal towns.

The country in general is a plateau which slopes abruptly toward the Mediterranean, and is divided into eastern and western table-lands by a narrow rift valley over 400 miles in length. There are several mountain ranges along the coast, the loftiest being in Lebanon. As vapor-laden winds blowing from the sea lose their moisture on the seaward slopes of the mountains, the country is in most sections too dry for agriculture. Several Jewish colonies, or agricultural communities, have been established in Palestine, and they raise cereals, cotton and fruits. These Jews have introduced a system of irrigation. Railroad and carriage-road facilities are poor, but since the outbreak of the War of the Nations the railroad system, which is controlled by the Ottoman Empire, has been extended to within less than 200 miles of the Suez Canal.

**Related Subjects.** For further information on this subject the reader is referred to the following articles in these volumes:

| | |
|---|---|
| Aleppo | Jerusalem |
| Arabs | Jews |
| Bedouins | Lebanon, Mountains of |
| Beirut | Palestine |
| Damascus | Turkey |
| Jaffa | |

**SYRIAC,** *seer'i ak,* one of the two dialects of Aramaic, the other being the so-called Chaldee. Syriac was spoken in Mesopotamia, and has literary monuments which date as far back as the first century of the Christian era. The oldest existing writing is a translation of the Old Testament, and most of the early manuscripts are versions of some part of the Bible. Down to the fourteenth century the language had a vigorous life.

From the fourteenth century it declined, but to the present time there remain in the Kurdish mountains and neighboring localities tribes who speak a language called Syriac. This differs considerably from Syriac proper.

**SYRINGA,** *si ring' ga,* a genus of large, hardy shrubs of the olive family, including the lilacs and jasmine, whose fragrant flowers make them popular as garden plants. In some species, as the lilacs, the individual flowers are small, but are borne in large clusters at the ends of the plant stems. One species, common in the southeastern part of the United States, bears large, white, single flowers. The mock orange is sometimes called syringa.

**SZEGEDIN,** *seg' ed een,* an important city of Hungary, the second in population, ranking next to Budapest. It is the capital of the County of Csongrád, and is situated on the west bank of the Theiss River, 118 miles southeast of Budapest (see map of Europe, following page 2092). It is the commercial center of a fertile agricultural region, and carries on a prosperous trade in grain, wool and tobacco. Since a disastrous flood, which occurred in 1879, Szegedin has been rebuilt into a fine, modern city, with broad, circular avenues, beautiful public squares and stately public buildings. Fine quays extend along the river and a dam has been erected to prevent further damage to the city. Szegedin is noted for its soap and various food products, such as Hungarian pepper (paprika) and a dough preparation called *tarhonya.* Population in 1910, 118,328.

THE WORLD BOOK
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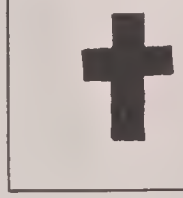
# Tt



T is the twentieth letter in the English alphabet, derived from the twenty-second and last of the Phoenician alphabet. This was the *tav,* or *mark,* which had practically the same value as the Greek *tau* and the English *t,* and was made much like a capital *T,* except that the vertical line extended through the crossbar. *T* is more closely related to *d* than to any other letter, and the two are often confused and used interchangeably in allied languages. In English, *t* has only one regular sound, but taken in connection with *i* it is often pronounced like *sh,* providing another vowel follows the *i* in the same syllable, as in *partial.* The Anglo-Saxons, when they adopted the alphabet from the Romans, added two letters, one of which was called *thorn,* and had the sound of *th.* It was shaped very much like a capital *Y,* and probably because confusion arose from the likeness, the letter was later dropped and the combination *th* substituted for it. This digraph, as it is called, is pronounced in two ways—as in *think* or *breath,* and as in *their* or *breathe.*

**TABER,** *ta'bur,* a town in the extreme southern part of Alberta. It is noted for its many coal mines, which employ 500 to 600 men and have a daily output of 1,000 to 1,500 tons. Taber is on the Crow's Nest Pass branch of the Canadian Pacific, thirty-two miles east of Lethbridge and eighty-four miles by rail west of Medicine Hat. In addition to coal Taber is a shipping point for large quantities of grain raised in the vicinity, and its elevators have a capacity of 100,000 bushels. Several schools, one costing $80,000, and the fine building of the Canadian Bank of Commerce, erected in 1913, are features of the town. It was founded and incorporated in 1906. Population in 1911, 1,400; in 1916, estimated, over 2,000.

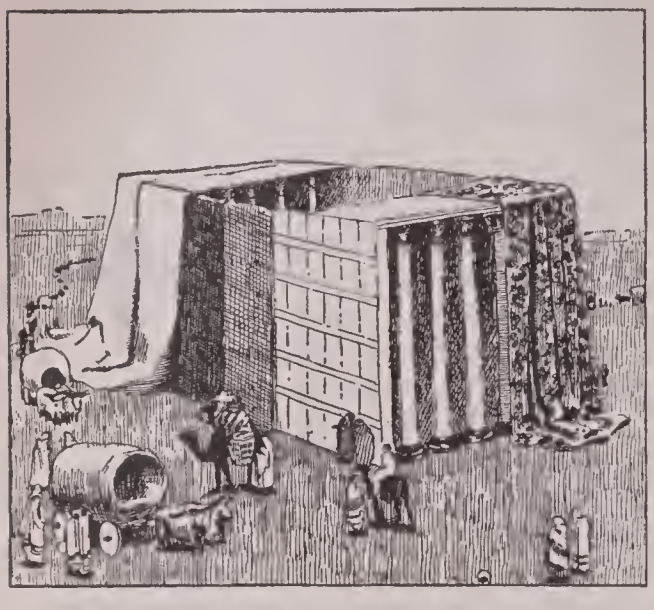
**TABERNACLE,** *tab'er nak'l,* or **TENT OF MEETING,** the center of worship of the Israelites during their wanderings in the wilderness. Moses received instructions while on Mount Sinai for its erection (*Exodus* XXVI, 30), and the materials were provided by the free offerings of the people. It was dedicated on the first day of the second year after the Exodus from Egypt.

The tabernacle was fifteen feet long, fifteen feet wide and fifteen feet high. Its framework was of acacia boards, overlaid with fine gold. The ceiling was of curtains of white linen, interwoven with blue, purple and scarlet cherubim. Above this was a curtain of goats' hair and outside of all a covering of skins. The interior was divided by the "veil," a curtain of linen similar to those of the ceiling, into the *Holy of Holies* and the *Holy Place.* The Holy of Holies contained the Ark of the Covenant, in which were kept the Tables of the Law, the pot of manna and Aaron's rod that budded. Above the ark was the "mercy seat," a cover of solid gold, surmounted by two golden cherubim. In the Holy Place were the table of shewbread, the altar of incense and the golden candlestick.

The tabernacle stood within a court, 150 feet long and seventy-five feet wide, enclosed by rich curtains and supported by brass pillars. It opened toward the east, and before it stood the altar of burnt offering, where the people brought their sacrifices to be offered by the priests. There was also a laver, where the priests washed their hands and feet before entering the Holy Place.

The tabernacle and its furnishings were so constructed as to be easily portable. It was in

the care of the Levites, who camped round about it. Above it hovered the pillar of cloud by day and the pillar of fire by night; these were the signs of Jehovah's presence. After the conquest of Canaan the tabernacle was set



ERECTING THE TABERNACLE
(Drawn from illustration in *Story of the Bible.*)

up at Shiloh and afterward removed to Nob and then to Gibeon. From the latter place it was brought to Jerusalem at the time of the dedication of Solomon's Temple, probably being preserved as a relic within the Temple walls. See TEMPLE.

Consult Kennedy's "Tabernacle," in Hastings' *Dictionary of the Bible.*

**TABERNACLES,** FEAST OF, an autumn festival of the Hebrews of Biblical days, lasting seven days, during which the people lived in booths, in commemoration of the time when their forefathers dwelt in tents in the wilderness. It also celebrated the ingathering of the harvest (*Deut.* XVI, 13). The dedication of the Temple by Solomon was held at the time of the Feast of Tabernacles (*I Kings,* VIII, 65), its length, on this occasion, being extended seven days. After the Exile, a number of rites were added, such as the ceremony of the waving of palms, the libation of water, etc. As at the Feast of Weeks and the Passover, all males were required to be present at the sanctuary during this feast. Following the final destruction of the Temple, the rabbis ordered its celebration continued at the individual synagogues, and it is thus celebrated by the Jews to the present day.

**TABOO,** *ta boo'*, also spelled TABU, a word of Polynesian derivation which has made its way into the current speech of civilized peoples, by whom it is employed with much the same meaning as *exclude* or *ostracize*. It is used as a noun, verb or adjective, as in the following sentences:

A taboo is placed on profanity among the Boy Scouts.

The legislature will taboo any member accepting a bribe.

Coarse manners are taboo.

The practice of taboo among the Polynesians and various other primitive peoples consists in setting apart certain objects as unclean or sacred or as having the power to injure. Such objects must not be touched. This custom prevails among tribes in America, Africa, Central Asia and India, and has a counterpart in certain religious practices of the Greeks, Romans and Jews.

Taboo takes various forms. There are taboos of foreigners, of innovations, of burial grounds, of parts of one's person, of objects set apart for kings, chiefs and priests, of sick persons, of sorcerers, and so on indefinitely. Taboo objects are marked by various methods, such as using a piece of white cloth, a stick with dry leaves or a bundle of branches painted red and white. The numerous restrictions imposed by the old Hebrew law in regard to sacred and unclean things were in effect examples of taboo.

**TABOR,** *ta'ber,* MOUNT, a mountain of Northern Palestine, which is conspicuous by reason of its isolation rather than because of its size. Rising abruptly to a height of about 1,000 feet above the plain of Esdraelon, it stands, a wooded, shapely cone, a landmark through all Galilee. The roads to the top lead through groves and thickets of oak, walnut and roses, in which wolves, foxes and other wild animals find hiding places, but the steepness and perhaps danger of the ascent are compensated for by the beautiful view to be obtained from the summit. All Galilee, Samaria and Perea lie spread out before the eye, with their villages, cultivated fields and water courses.

Like most other mountains of the Holy Land, Tabor was early looked upon as a sacred spot. The Old Testament refers to it as the site of a sanctuary, and as the place to which Barak summoned his forces for the desperate conflict with Sisera (*Judges* IV). As it was but seven miles from Nazareth, the boyhood home of Jesus, it must have been a familiar spot to Him, yet the New Testament makes no mention of it. The early Christians looked upon it as the mount of Christ's transfiguration, and built upon it churches and monasteries, but research has proved that during all the period of

Christ's life, and for centuries before, a fortified town occupied the summit.

**TABRIZ,** *ta breez',* the most important commercial center of Northwestern Persia, the second largest city of the country, ranking next to Teheran. It is the capital of the province of Azerbaijan, and is situated about thirty-five miles east of Lake Urumiah, at an elevation of 4,500 feet above sea level. Its original importance and population have been greatly affected by numerous violent earthquakes. The inner portion of the city is unattractive, despite its well-stocked bazars and many mosques, but the outlying quarters have beautiful gardens and orchards. Before the Caspian Sea became the commercial highway of the territory, Tabriz was the trade center for Persia, India and the Turkish and Russian dominions. There is still a good trade in rugs, shawls and dried fruits, and the rugs of Tabriz are among the finest produced by a country famous for this industry (see Carpets and Rugs).

Tabriz is the residence of a bishop of the Gregorian National Armenians and has five Armenian churches. There is a military college here, and the city is the headquarters of a branch of the Imperial Bank of Persia. It is connected with Julfa, on the Russian frontier, by a railroad, which was opened in 1916. During the War of the Nations the place was captured in turn by the Turks and the Russians.

**TACHÉ,** *ta shay',* Alexander Antonin (1823-1894), a Canadian churchman, Roman Catholic archbishop of Manitoba, a man who wielded a greater influence over the Indians and half-breeds of the Northwest than any man has wielded either before or since his time. For forty years he labored among them, with the result that he stands without a rival in his field.

ARCHBISHOP TACHÉ

Archbishop Taché was born at Rivière du Loup, Que. He received a good education at Saint Hyacinthe College, Montreal Theological Seminary and Chambly College, and then in 1842 became instructor of mathematics in Saint Hyacinthe College. Two years later, however, he resigned to become a novice in the Order of the Oblate Fathers. Taché was a great-great-grandson of Louis Joliet, and in his veins coursed the blood of the Sieur Varennes de la Verandrye. With such ancestors Taché was naturally a man to break a new path. He volunteered for missionary service among the Indians in the Red River district, and after an arduous overland journey of two months reached Saint Boniface in August, 1845.

Three months after his arrival at Saint Boniface, Taché was ordained a priest. Thereafter, except for a year spent in France, Saint Boniface was his home. He became known throughout the West for the long journeys he made, for his courage and zeal, and as the result of these traits had a remarkable influence over the Indians. In 1851 he was summoned to France for promotion by the Superior of the Oblate Fathers, but after a year was allowed to return to Canada and in 1853 was created bishop of Saint Boniface.

During the troubled period which preceded the formation of Manitoba as a province, the bishop urged upon the Dominion government the necessity of adjusting the grievances of the Indians and half-breeds. Had his advice been followed the Red River Rebellion might have been averted. As it was, when the trouble came, he was in Rome, but he hurried home, too late to prevent bloodshed but still in time to help in the settlement. In 1871 Saint Boniface was made a metropolitan see, and Taché became the first archbishop. He died at Winnipeg, and was buried in the cathedral at Saint Boniface.

Consult Dent's *Canadian Portrait Gallery.*

**TACHÉ,** Sir Etienne Pascal (1795-1865), a Canadian statesman, twice Premier of Canada and chairman of the Quebec Conference at which the terms of Confederation were agreed upon. Taché was born at Saint Thomas, Que. Although his schooling was not finished, he enlisted in the Canadian militia in 1812 and served throughout the War of 1812. At its close he studied medicine, and in 1819 was admitted to practice. He remained in active practice until 1841, when he entered the Canadian Assembly. He resigned in 1846 to become deputy adjutant-general of the Canadian militia, but in 1848 again entered the Assembly and in March of that year became Commissioner of Public Works in the Baldwin-Lafontaine Ministry. From 1849 to 1851 and again from 1852 to 1856 he was Receiver-General. In the latter year he was appointed speaker and a life member of the legislative council, and by the end of the year he became Premier in the first Taché-Macdonald Ministry. In 1864 Taché

and Sir John Macdonald again formed a Ministry with the former as Premier, but in both ministries Macdonald was the real head of the government. Taché was knighted in 1858.

**TACITUS,** *tas'i tus,* PUBLIUS CORNELIUS (about 55-120), a Roman historian, one of the greatest of all ages. Of his life nothing is known except what may be learned from his occasional references to himself and from a series of letters written to him by his intimate friend, the younger Pliny. These sources tell us only that he held various public offices under Vespasian, Titus, Domitian and Nerva, that he won a reputation as an orator and lawyer, and that he married the daughter of Gnaeus Julius Agricola. His alliance with this distinguished soldier and statesman probably had an influence in procuring his various promotions in office.

Of the writings of Tacitus there remain the discussion of eloquence, *Dialogue on Orators,* his first work, published early in life, and by some critics believed not to be genuine because it contains few of the distinctive mannerisms of Tacitus; the *Agricola,* a biography of his father-in-law, universally acknowledged to be a masterpiece; the *Germania,* a description of the institutions and customs of the various German tribes, written, it has been thought, to serve a political purpose by calling the attention of the Romans to the possible danger from these neighbors; the *Histories,* of which there remain only the first four books and a part of the fifth, giving an account of the years 69-70; and the *Annals,* which originally consisted of sixteen books, giving the history of Rome and its provinces from the death of Augustus to that of Nero, but of which books seven to ten inclusive, with parts of others, are lost.

Consult Dimsdale's *A History of Latin Literature.* Translations of the *Dialogues, Agricola* and *Germania* may be had in the Loeb Classical Library.

**TACKING.** See SAILBOAT AND SAILING.

**TACOMA,** *ta ko'ma,* WASH., the county seat of Pierce County, is a seaport on Commencement Bay, an inlet of Puget Sound, and the center of an important lumber industry. It is in the west-central part of the state, twenty-eight miles south of Seattle and 140 miles north of Portland, Ore. The Puyallus River flows through the city and empties into the bay, which expands into an excellent harbor. Tacoma is the western headquarters and terminus of the Northern Pacific Railway. Railroads entering the city are the Chicago, Milwaukee & Saint Paul, the Great Northern, the Oregon and Washington Railroad & Navigation Company and the Tacoma Eastern. The city is growing very rapidly. In 1910 it had a population of 83,743; this had increased to 112,770 in 1916 (Federal estimate).

Tacoma occupies an uneven, picturesque site of about forty square miles. The land rises from the level of the river to a height of several hundred feet, and the greater part of the city is built upon a plateau about 200 feet above the bay. On the west are the Olympic Mountains and on the east the Cascades, both of which are ranges of snowy peaks and pine-covered slopes. Tacoma is the gateway to Mount Rainier National Park, to the southeast, a region yearly attracting thousands of visitors (see RAINIER, MOUNT). The largest parks of the city are Point Defiance (640 acres), Wright (28 acres) and McKinley (31 acres). The Federal building, courthouse, city hall, Carnegie Library and the Chamber of Commerce are important buildings. The State Historical Society and Terry Museum of Art occupy rooms in the public library. Tacoma has the Whitworth College (Presbyterian), the University of Puget Sound (Methodist Episcopal), the Annie Wright Seminary (Protestant Episcopal), the Pacific Lutheran University and an Indian school. The city contains a number of hos-

pitals, the largest of which are the city and county, Saint Joseph's and the Fanny Paddock Memorial hospitals. A short distance south is the Washington Hospital for the Insane.

Extensive tracks of timber, coal mines, a fertile adjacent agricultural territory, facilities for manufacturing, and domestic and foreign trade all contribute to the industrial importance of Tacoma. It is a seaport whose ships trade with coast cities, Europe and the Orient. A local estimate for 1916 placed the value of foreign exports at $42,000,000 and the value of the total ocean commerce at $75,000,000. Wheat, lumber, coal, fish and fruit are the chief articles of trade. The manufacture of lumber products is by far the most important industry; the lumber and woodworking plants produce an annual output worth $10,000,000. Other important industrial plants are smelters, furniture factories, flour and cereal mills and packing houses.

Old Tacoma, founded in 1868, and New Tacoma, founded about 1869, were consolidated in 1883 to form Tacoma. In 1910 the commission form of government was adopted. G.S.

**TACONIC,** *ta kon'ik,* **MOUNTAINS,** a range of low mountains uniting the Green Mountains of Western Vermont with the Highlands of the Hudson, and forming part of the boundary between New York and Massachusetts (see GREEN MOUNTAINS). Equinox in Vermont (3,816 feet) and Greylock in Massachusetts (3,538 feet) are the highest peaks of the range. Like the other mountains in this region, the Taconic are attractive, green-covered hills with rounded summits.

**TACTICS,** *tak'tiks,* the science and act of arranging and maneuvering troops on the field of battle. The object of *strategy* is to force the enemy to battle under conditions disadvantageous to him; the object of *tactics* is to win the battle by the use of all arms—infantry, cavalry and artillery. The duties and possibilities of these three branches of an army are dissimilar, but the result entirely depends on their coöperation as a whole force. As a good mechanic must thoroughly understand the tools he works with, and an engineer must know his engine, so must a commander, to be a tactician, know the limitations and possibilities of the arms under his command. Lack of such knowledge may lead to the putting of undue strain on certain parts of the army machine, or to letting great strength run to waste in other parts.

**Infantry.** Infantry is now, as it always has been, the principal arm of the service, and the tactical dispositions of all troops are in reality preliminaries to the final and decisive assault by infantry which is the object of every commander. Artillery of heavy type is used for many hours to clear the way and to demoralize the enemy. In attacking a position, infantry is usually marched in column (close order) until almost within range of the enemy's artillery fire, at about 3,500 or 4,000 yards, when the order to deploy or "open out" is given. Under the cover of its own artillery fire, sent over the heads of the infantry, the troops continue to advance, supports and reserves following. Taking advantage of every natural protection, the advance develops into a series of rushes, between which the infantry men lie down and deliver a rapid and concentrated fire at the enemy's position. The artillery continues to shell the position, with the object of assisting and supporting the advance and subduing the enemy's fire. With modern magazine rifles the result of such attacks is practically settled at a distance of 800 or 900 yards. Either the position is then taken by assault, or the attacking forces are repulsed.

**Artillery.** As already stated, artillery always prepares the way for an attack, by incessant bombardment. While the attack is proceeding, the duties of the artillery are for one section to shell the enemy's position as long as possible without endangering the advancing infantry, to watch carefully for counter attack and to shell hostile infantry with the last ounce of their strength, while another section, with a series of rushes, follows up the attacking infantry, throwing aside the need for concealment, and vigorously assisting the final assault. As a general rule it may be laid down that attacking infantry cannot succeed if their own artillery has been disabled in the preliminary duel, and the artillery could not achieve complete success unless supported by the later infantry attack.

**Cavalry.** Until the War of the Nations it had always been the object of the wise commander to threaten or attack the enemy's flank, and this involved the use of cavalry. Points of vantage, such as hills, woods and villages, would be seized and held to act as a screen to the movements of outflanking troops behind them. Flying machines made this secrecy impossible. At the beginning of the War of the Nations it was believed that there would be much work for cavalry units, but the system of trench warfare which immediately developed made useless that hitherto important military arm, and opened the era of big guns.

**Naval Tactics.** As the introduction of modern firearms has completely changed the aspect of military tactics, so has steam (combined with modern weapons) changed naval warfare. The old style wooden vessels had not only to fight but to maneuver for wind, a matter now entirely disregarded. The general principles of military tactics may be applied to naval warfare, in that the object is to oppose the enemy with a superior or better placed and maneuvered force. The development of signaling, especially the introduction of the wireless telegraph, air planes and searchlights greatly facilitated naval tactics. In the United States navy the principal battle formations are called *line, column* and *echelon*. Ships advancing abreast are said to be in line, in column when one behind the other, in echelon when advancing in a diagonal line. A *fleet* consists of two or more *squadrons* of from two to eight ships each. A *division* is half a squadron of more than five vessels belonging to a squadron or division.

In a sea fight, as in a land fight, if the line of battle be broken, an opportunity is presented to destroy the disorganized vessels, as their power is weakened when not acting in direct coöperation. Naval battles are now settled at long distances (in the Battle of Jutland, ten or eleven miles), and should vessels become separated from their line of battle, they are an easy prey to the enemy. F.ST.A.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Army | Strategy |
| Navy | War of the Nations |

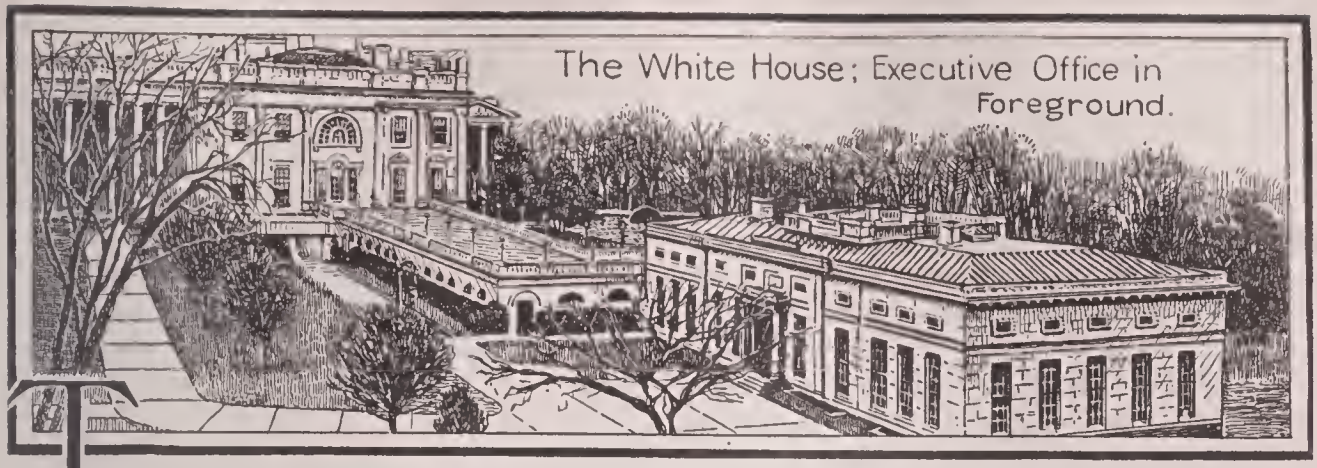
**TADPOLE,** *tad'pohl.* The first period in the life history of a frog or toad, after it hatches from the egg, is known as the tadpole, or larval, stage. When the creature first hatches it looks like a lump of dark jelly with a head and a tail. There are no gills, no mouth and no eyes, but on certain parts of the body there are hair-like processes which enable it to push itself forward in the water. Gills, eyes and mouth then develop, and, in the course of time, the gills are replaced by lungs, the tail is absorbed, and legs appear. These last changes mark the end of the tadpole stage and the beginning of the mature period. For illustration of tadpole and further details, see FROG.

**TAFFETA,** *taf'e ta,* a variety of silk fabrics, the name being derived from a Persian word *taftah,* meaning "spun" or "woven." *Taffeta* was originally used as the name of all plain silks which were made simply by alternating the threads of the warp and the woof. At various times various qualities have been ascribed to the silk called taffeta; in the sixteenth century it was "very thick and costly;" in the seventeenth it was "very soft and thin;" and about 1750 it was described as a "lustrous silk, sometimes checkered or flowered, and sometimes striped with gold and silver." In common use to-day the name is given to all *plain* silks as distinguished from corded or twilled fabrics (see WEAVING).

**TAFT,** LORADO (1860- ), an American sculptor, teacher and lecturer on art subjects, whose genial personality and clear and interesting way of presenting his subject have won him popularity as a public speaker. He was born at Elmwood, Ill., and was graduated at the University of Illinois in 1879. After completing an art course in Paris, at the School of Fine Arts, he established a studio in Chicago, which has since been his headquarters. In 1886 he became an instructor at the Chicago Art Institute, and in that capacity has exercised a helpful influence over thousands of young people. In 1909 Taft was made professorial lecturer at the University of Chicago.

His work represents a blending of the ideal and realistic tendencies in sculpture. One of his best-appreciated sculptures is a symbolic group called *The Spirit of the Great Lakes,* which has been set up on the south façade of the Art Institute (see illustration, page 1311). He also designed a remarkable colossal *Fountain of Time* for Chicago's Midway Plaisance, a boulevard connecting Jackson and Washington parks. Other works include the *Columbus Memorial Fountain,* at Washington, D. C.; the *Washington Monument,* Seattle; *The Blind,* suggested by Maeterlinck's drama of that name, and *Solitude of the Soul.* He has written a *History of American Sculpture,* the best work on the subject yet written.

SCULPTURE BY TAFT
"Solitude of the Soul," in the Art Institute, Chicago.


The White House; Executive Office in Foreground.

TAFT, WILLIAM HOWARD (1857- ), an American statesman, the twenty-seventh President of the United States. It was the tragedy of President Taft's administration that it transformed him from one of the most popular of Americans to one who came to be disliked by a large section of the people. By temperament and training Taft was a judge. The very traits which are most admirable in a judge—studious habits, deliberate decisions—were most exasperating in a President at a time when quick decisions and a keen grasp of new things were needed. As President, moreover, Taft lacked the personal picturesqueness of his predecessor, Roosevelt, with whom he was constantly compared, and with whom he finally quarreled.

In the course of years the mistakes made by the Taft administration will seem less significant, and historians will be inclined to give more heed to its high aims and just motives, and to its real and great achievements. In the heat of political conflict, charges of bad faith and evil motives were so frequent that the essential fairness of the President's position was often lost to view. As with Grover Cleveland, so with William Howard Taft; the unpopularity of the moment may be turned into lasting respect—in fact, is already so turning. In private life President Taft's virtues were honored without stint, and he won the liking of men with whom he came into intimate relations; his bitterest political opponents could yet remain among his good friends.

William Howard Taft was born on September 15, 1857, at Cincinnati, Ohio. He was the son of Alphonso Taft and his second wife, Louisa Torrey, both of whose ancestors joined the Massachusetts Bay colony in the first half of the seventeenth century. Alphonso Taft was an able lawyer and a distinguished public servant. He first came into national prominence as a judge of the Cincinnati superior court, when he upheld the right of the local board of education to abolish the reading of the Bible in the common schools. Although this decision cost him the governorship of Ohio, it gave him a national reputation, which President Grant recognized when he made him Secretary of War (March, 1876) and then Attorney-General (May, 1876).

In 1874, after his graduation from the Woodward High School of his native city, young Taft entered Yale University. There he frankly set out to win honors for scholarship. It is noteworthy, however, that his attention to his studies did not keep him from becoming one of the most popular men in his class, and in his senior year he was elected to one of the exclusive, secret "senior societies," or clubs. At graduation he ranked second in a class of 121 men. Returning home, he studied at the Cincinnati Law School, and when he was graduated in 1880 he shared first honors with one other. It is interesting to note that Robert, President Taft's eldest son, graduated in 1913 from the Harvard Law School with the highest honors which that institution had ever awarded.

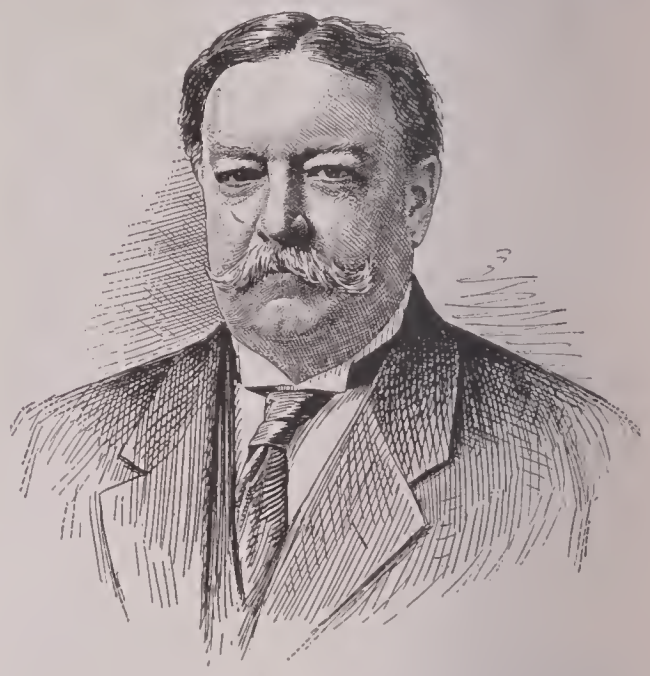
Instead of entering immediately on the practice of his profession, the future President became law reporter for the Cincinnati *Times*, which was owned by his half brother, Charles Phelps Taft (born 1843). As the son of Judge Alphonso Taft and as the younger brother of one of the leading Cincinnati newspaper owners, he was almost from the day of his admission to the bar under the watchful eye of the local Republican party managers, but it was his demonstrated ability that brought him such rapid advancement that at thirty he ascended the bench as judge of the Ohio superior court. In the meantime he had been assistant prosecutor of Hamilton County, collector of internal revenue and assistant solicitor of Hamilton County. He was serving in the last office when Governor Foraker in 1887 appointed him to fill a vacancy on the superior court. When Taft's

term expired he was reëlected, but he resigned in 1890 when President Harrison appointed him Solicitor-General of the United States.

Thus at the early age of thirty-three Taft was second in command of the Federal Department of Justice. In this position he was given charge of the "Sayward case" before the United States Supreme Court. This was a test case brought by the Canadian government to determine the authority claimed by the United States over the seal fisheries in Bering Sea (see Bering Sea Controversy). Taft's brief was clear on every point and convinced the court. Shortly afterward he was called on to defend the McKinley Tariff Act, whose constitutionality was attacked because it had been passed by a quorum counted by the Speaker of the House of Representatives but not voting on the roll call. The Solicitor-General convinced the court of the constitutionality of the law by pointing out the clause of the Constitution which provides that a minority in either House may "compel the attendance of absent members in such manner and under such penalties" as it may provide; this clause would be worthless if the returned members could prevent a quorum by refusing to answer to their names. In both these cases Taft's arguments won national attention.

**On the Federal Bench.** In 1892 President Harrison appointed Taft to the bench as judge of the sixth circuit on the newly established Court of Appeals. During the eight years in which he sat on the bench, Judge Taft became a national figure, particularly for his decisions regarding railroads and organized labor. These decisions were noteworthy for the open-mindedness with which he dealt justice both to capital and to labor. Perhaps the most important case which Judge Taft decided was one involving the Addyston Pipe & Steel Co. This case was a suit by the Federal government to break up a monopoly in cast-iron pipe. In his opinion Judge Taft reviewed the history of this typical trust, and showed that it was in fact a combination which aimed at and had succeeded in placing restraints on the trade in cast-iron pipe. The decision was all the more important because the case involved the three principal illegal features—restraint of trade in interstate commerce, conspiracy and fraud—and also because it had been preceded by a number of cases in which the government had been defeated. Taft's opinion was so complete that the United States Supreme Court, when it refused to set aside the judgment, incorporated it bodily in the decree of affirmation. In 1894 Judge Taft granted an injunction against one F. W. Phelan, because the latter, as the agent of Eugene Debs, was endeavoring to tie up railroad traffic, and about the same time he delivered a decision declaring the secondary boycott illegal.

**Governor of the Philippine Islands.** In 1900, at the close of the Filipino insurrection, President McKinley appointed a civil commission, partly to investigate conditions and partly to govern the islands. Of this commission Judge



WILLIAM HOWARD TAFT

His ambition was to become a useful member of the Supreme Court, but he became President of the United States, almost against his will.

Taft, against his desires, was made chairman. With the four other members he made a tour of the islands to learn their needs at first hand. As a result of this investigation civil government was restored on July 4, 1901, and Judge Taft became the first civil governor. During the four years for which he held this office he not only carried out the work he was sent to do, but made himself popular both among the natives and the American residents, and won a high reputation as a colonial administrator. After order was restored, Governor Taft introduced, one by one, minor civil courts in various parts of the island, a new system of land records, records of vital and social statistics, sanitary regulations, common schools, with Americans as teachers, and many other improvements. One of the greatest achievements of his administration was the successful negotiation with Pope Leo XIII for the purchase of the friars' lands, vast tracts owned by the four Roman Catholic missionary Orders established

in the islands. In order to complete these negotiations, Governor Taft made a successful trip to Rome.

**In the Cabinet.** In 1903, in the midst of his work in the Philippines, Governor Taft was offered a place on the Supreme Court of the United States, a place he much desired. His reply to President Roosevelt reveals the heavy responsibility which rested on him, and by inference, shows the vast influence he had won in the islands among the natives. It was as follows:

> Great honor deeply appreciated, but must decline. Situation here most critical from economical standpoint. Change proposed would create much disappointment and lack of confidence among people.

A year later, however, he accepted the Secretaryship of War in President Roosevelt's Cabinet. Great progress had been made in the islands in the year, so that the change was less hazardous. As the islands, too, were under the direction of the Secretary of War, Taft's experience proved most valuable. Far from restricting his activities to office work, his new position widened his range. He was soon recognized as the spokesman of the administration, and represented it on many occasions. In 1906 he served temporarily as Governor of Cuba, after the intervention of the United States in the affairs of that infant republic. A year later he visited the Panama Canal Zone, and established American government there. In the same year he made a trip around the world, primarily for the purpose of attending the opening session of the Philippine Legislative Assembly. He also visited Japan and China, and diplomatically disposed of several problems which had caused complications in the relations of the United States with those countries.

**Candidate for President.** It was about this time that President Roosevelt let it become known that he favored the nomination of Taft in 1908 as the Republican candidate for President, and in the months immediately preceding the national convention the President's influence was ardently thrown in favor of his Secretary of War. In a public statement Taft had previously said:

> * * * my ambition is not political; I am not seeking the Presidential nomination; I do not expect to be the Republican candidate.

Taft's own popularity, added to President Roosevelt's influence, easily gave him the nomination, by a vote of 702 out of 980 delegates on the first ballot. His running mate was James S. Sherman of New York, a well-known member of the House of Representatives. The Democratic candidate was William J. Bryan, already twice defeated. The campaign was not very exciting, and Taft and Sherman were elected (November, 1908) by 321 electoral votes to 162 votes for Bryan and John W. Kern. The popular vote was 7,679,006 for Taft to 6,409,106 for Bryan.

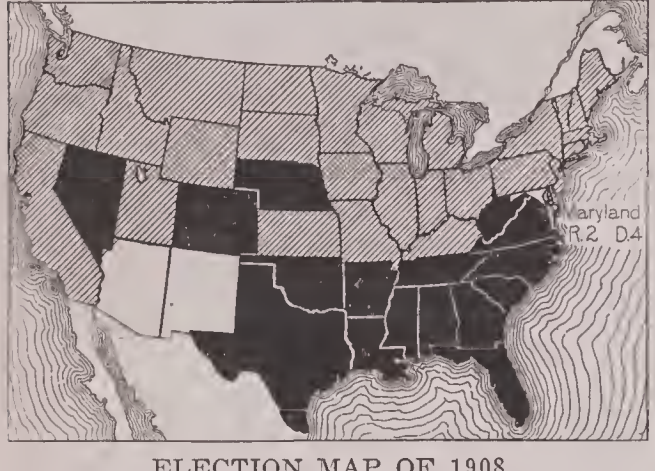
## *The Administration of William Howard Taft*

**The Payne-Aldrich Tariff Law.** During the campaign and the months immediately following his election, President Taft was generally believed to be progressive. The fact that he had President Roosevelt's support was assumed as evidence that the Taft administration would proceed along the same lines of policy as had its predecessor. But such did not prove to be the case. After his inauguration President Taft at once called Congress in special session to revise the tariff. The popular sentiment was unquestionably in favor of "revision downward," but the Payne-Aldrich law as finally passed made few important reductions and a considerable number of increases in duties. Even the President admitted that the law was too strongly protectionist, and that it did not comply with the spirit of the Republican platform upon which he had been elected. He approved it, nevertheless.

**Important Legislation.** In view of its amazing political results, the Payne-Aldrich Tariff is perhaps the outstanding legislative feature of the administration. The administration should be judged, on the contrary, at least partly on the constructive measures passed. These included the establishment of the postal savings bank system (1910) and the parcel post (1912), the organization of a Commerce Court and the enlargement of the powers of the Interstate Commerce Commission (1910); acts requiring publicity for campaign contributions for Federal elections; and acts providing civil government for Alaska and creating the Department of Labor. In 1912 Congress passed an act exempting American-owned ships from the payment of tolls for passage through the Panama Canal. This law caused foreign complications, and the exemption clause was repealed in 1914. Another interesting bill, which was vetoed by

President Taft in 1912, provided a literacy test for immigrants.

**Foreign Relations.** For its achievements in diplomacy the Taft administration ranks among the highest in the history of the United States. It was constantly facing difficult problems, and these were settled to the benefit of the United States. In 1909 the second American occupation of Cuba came to an end, and in the same year a long-standing dispute with Venezuela was submitted to the Hague Tribunal. Secretary Knox in 1910 proposed to the various nations that the Hague Tribunal be made a permanent court of arbitration. At the same time he was negotiating arbitration treaties with France and Great Britain; these treaties were ratified by the Senate on March 7, 1912, but in such amended form that the President refused to submit them to the governments concerned. The year 1910 also witnessed the end of the fisheries dispute with Great Britain and the beginning of a dispute with Russia. The latter




ELECTION MAP OF 1908

The states shown in black gave their electoral votes to Bryan, Democrat; in the shaded area, to Taft, Republican. The white areas were at the time nonvoting territories.

country, by refusing to honor passports issued by the United States to naturalized Russian Jews, drove the President to abrogate the commercial treaty of 1832. Congress by resolution approved this course.

*Reciprocity with Canada.* One of the things on which President Taft had set his heart was the negotiation of a reciprocity treaty with Canada. An arrangement, popularly called the Taft-Fielding treaty, was made, reducing the tariff duties on a list of commodities exchanged between the two countries. A bill incorporating these changes passed Congress in 1911, but in Canada reciprocity was defeated (see page 1128).

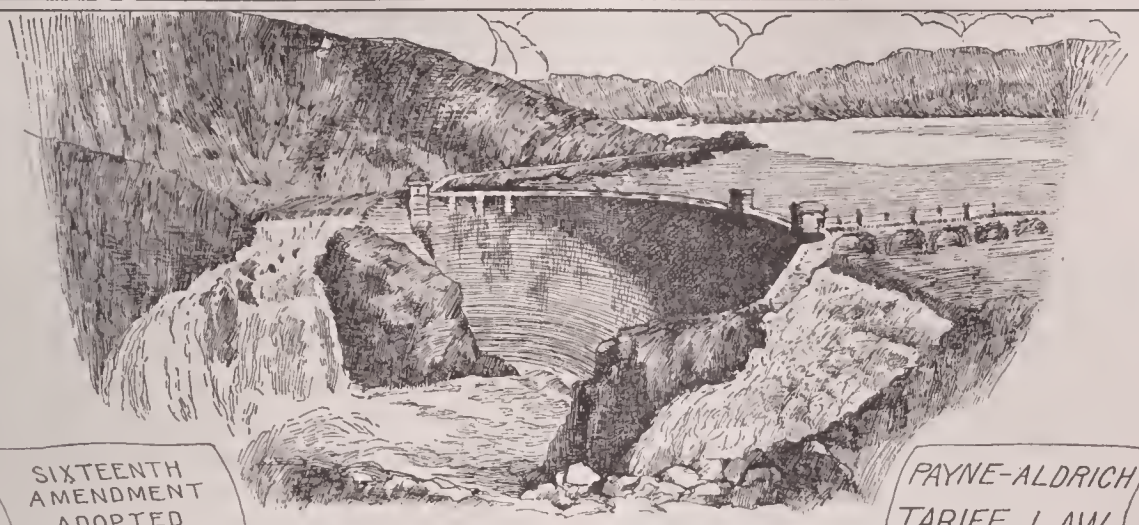
*"Dollar Diplomacy."* Until the nineteenth century it was customary for a nation to use diplomacy to advance its commercial interests. "Dollar diplomacy," as expounded and practiced by Secretary of State Philander C. Knox, was a reversal of this practice—it meant the use of trade and commerce to advance a nation's diplomatic prestige. A good example of this policy was the "six-power loan" to China. That country desired to enlist foreign capital. Secretary Knox did not wait for American bankers to ask for backing, but at once, in 1912, urged them to join with the European lenders and thus secure for the United States a share in the influences working on the Chinese government.

Another example of "dollar diplomacy" was the treatment of Nicaragua and Honduras. In order to encourage American investment in the loans of these nations, the United States government obtained the right to collect taxes. The amounts collected could then be applied on the interest of the loans. "Dollar diplomacy," in few words, meant that the flag follows trade instead of that trade follows the flag.

*Mexican Affairs.* Beginning in 1910 and continuing to the end of his term, President Taft's most serious foreign problems arose out of the disturbed conditions in Mexico. The revolution of 1910, led by Madero, resulted in the fall of Diaz, and the revolt of 1913, led by Huerta, caused the overthrow of the Madero government and the death of its chief. The President was averse to intervention, but in an emergency, in the spring of 1911, he ordered 15,000 troops to protect the Mexican border. At the same time he notified the Mexican government that intervention was not intended. With the Madero government the United States was on friendly terms, but President Taft, a month before the end of his term, refused to recognize the government of General Huerta, and thus left a difficult problem for his successor, Wilson.

**Economic, Social and Political Unrest.** Not only in foreign affairs did President Taft's administration face serious complications. These four years, 1909-1913, are remarkable for social and political changes, some of which came suddenly, and some after years of discussion. Upheaval was apparent in many forms, in concrete changes as well as in talk and thought. A general discontent with many political and economic conditions was evident throughout the country. The spread of prohibition and woman suffrage, the introduction of the direct primaries and the popular election of United States Senators, the extension of the initiative,

# 1909 TAFT'S ADMINISTRATION 1913



Roosevelt Dam Completed

SIXTEENTH AMENDMENT ADOPTED PROVIDING FOR INCOME TAX

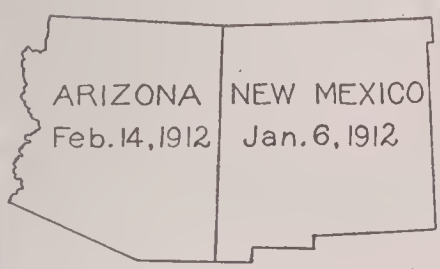
SEVENTEENTH AMENDMENT PROPOSED FOR DIRECT ELECTION OF SENATORS

PAYNE-ALDRICH TARIFF LAW

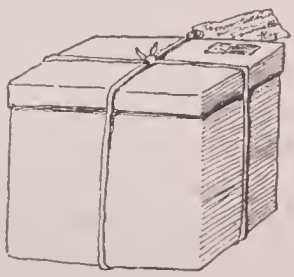
PROTECTIVE TARIFF

1909

Emblem of National Progressive Party. Organized 1912




Two New States Admitted



Parcel Post Organized 1913

Five More States Adopt Woman Suffrage

Glacier National Park Established 1910

referendum and recall, the commission form of municipal government, the city manager, the frequent investigations into the affairs of trusts, the conservation movement, and, finally, the breach in the Republican party—these were all signs of the times.

Woman suffrage made tremendous strides between 1909 and 1913. Washington in 1910, California in 1911, Arizona, Kansas and Oregon in 1912 were added to the list of states which have granted full suffrage to women. These brought the total to twelve states at the end of the Taft administration. Another striking movement was the rapid spread of prohibition. As a matter of fact only one state, West Virginia (in 1912), adopted prohibition while Taft was President, but the movement was gathering force which was revealed by the addition of five states to the "dry" column in 1914 and 1915, and by many additions to the local option "dry" areas. One of the most significant political changes since the War of Secession was the adoption of the Seventeenth Amendment to the Constitution. It provided for the popular election of United States Senators. It was proposed in 1913, but did not become effective until after the expiration of Taft's term. Another great change was the Sixteenth Amendment, which was adopted in 1913, and authorized the levy of a direct Federal income tax. In a few years this was to become one of the chief sources of the national revenue.

While the existing unrest thus expressed itself in certain concrete achievements, it was also revealed in a general tendency to investigate. Thus the President, by virtue of a clause in the Payne-Aldrich Act, appointed a tariff board of five members to study the making of future tariffs. The board had no legal standing, and much of its labor was wasted. Another great investigation was that conducted by the National Monetary Commission, headed by Senator Nelson W. Aldrich; out of its report grew the Federal Reserve Bank system (see Banks and Banking).

*The Anti-Trust Tendencies.* But what will probably be longest remembered as the distinguishing feature of the Taft administration was its attitude towards the great trusts. The Attorney-General, George W. Wickersham, organized a bureau for the purpose of studying suspicious-appearing corporations and obtaining evidence. Suits at law and in equity were brought against about seventy trusts, including those which controlled the manufacture or distribution of sugar, beef, lumber, paper, window glass, bathtubs, wire, steel, harvesters, shoe machinery and shipping. In 1911 the Supreme Court ordered the dissolution of the Standard Oil Company and the so-called "tobacco trust." All trusts were pursued with impartiality, with the result that more combinations were called in civil or criminal suits than had been attacked by all of Taft's predecessors since the passage of the Sherman Act in 1890. At the same time the spirit of the public was indicated by Congressional "investigations," none of which had results of lasting importance. The most conspicuous was the investigation of the "money trust," or the banking and financial interests. The facts disclosed were of value in framing the Federal Reserve Act and the Clayton Anti-Trust Act in the succeeding administration.

*Ballinger-Pinchot Controversy.* Almost at the outset of his term President Taft identified himself, perhaps unwillingly, with the extreme conservative Republicans as against the progressive element. In the Ballinger-Pinchot dispute he sided with his Secretary of the Interior, Richard A. Ballinger, and dismissed Gifford Pinchot from office. Pinchot had charged that the Interior Department had encouraged illegal entries for Alaskan coal lands and in other ways had abandoned the policy of conservation of natural resources as begun in the Roosevelt administration. Technically Pinchot was guilty of insubordination, for which he was dismissed, but the fact that the evidence against Ballinger was strong might have justified the President in taking some other course. He, however, stood by the Secretary, who was ultimately exonerated by a Congressional committee.

**The Breach in the Republican Party.** During the Roosevelt administration there had arisen a fairly sharp distinction between the conservative and the progressive elements in the Republican party. The latter generally had the support of the President, and when Taft took office on Roosevelt's recommendation, it was assumed that he would continue Roosevelt's policies. By his defense of the Payne-Aldrich Tariff Act, however, President Taft immediately alienated the progressive Republicans. The two factions were further divided by the more or less openly avowed sympathy of Roosevelt with the insurgents, on his return from Africa. The breach between the two factions led to a Democratic victory in the Congressional elections of 1910, and gave the Democrats control of the House of Representatives. The Democrats, aided from time to time by the insurgent Republicans, carried tariff

# *OUTLINE AND QUESTIONS ON WILLIAM HOWARD TAFT*

## *Outline*

**I. Preparatory Years**

(1) Birth and family
  (a) Father a distinguished jurist
(2) Education
  (a) College aims
  (b) Law study
(3) Early legal practice

**II. Public Life**

(1) State judiciary offices
(2) As United States solicitor-general
  (a) Important cases
(3) On Federal bench
  (a) Important cases involving capital and labor
(4) As governor of Philippines
  (a) Excellence as administrator
  (b) Introduction of reforms
(5) As Secretary of War
  (a) Spokesman of the administration
(6) Election to Presidency
  (a) Roosevelt's support
  (b) Quiet campaign

**III. Administration**

(1) Domestic affairs
  (a) Payne-Aldrich Tariff Law
    1. Dissatisfaction
    2. Political results
  (b) Establishment of postal savings bank
  (c) Parcel post established
  (d) Organization of Commerce Court
  (e) Prosecution under Anti-Trust Law
    1. Dissolution of Standard Oil Company
(2) Foreign relations
  (a) Occupation of Cuba ended
  (b) Venezuela dispute submitted to Hague tribunal
  (c) Fisheries dispute with Great Britain
  (d) Commercial treaty with Russia abrogated
  (e) Canadian reciprocity question
  (f) "Dollar diplomacy"
  (g) Mexican trouble
(3) Internal and local affairs
  (a) Spread of prohibition and woman suffrage
  (b) Ballinger-Pinchot controversy
  (c) Admission of two states
  (d) Hudson-Fulton celebration
  (e) Dedication of Roosevelt Dam
  (f) Glacier National Park opened
  (g) Breach in Republican Party
  (h) Election of 1912

**IV. Later Years**

(1) Professorship at Yale University
(2) Chairman of Red Cross committee
(3) The League to Enforce Peace
(4) Writings

## *Questions*

What was meant by "dollar diplomacy," and in what way was it in effect a reversal of the previous practice?

Explain Taft's clever use of a clause from the Constitution to establish the constitutionality of a Federal act.

To what, primarily, was Taft's election to the Presidency due?

What "playground" did the nation have at the close of this administration which it did not have at the beginning?

What political party was founded during this administration? Give the circumstances of its birth.

Who was Gifford Pinchot and what part did he play in the history of this administration?

What other President was very popular at the beginning of his term and extremely unpopular at the end? What similarity is there in the later life of the two?

How did Taft's avowed purpose on entering college differ from that of his predecessor?

measures lowering the duties in several special schedules, and passed other laws of a "radical" nature, all of which were vetoed by the President.

The factional disputes among the Republicans continued until they became centered on the Presidential nomination for 1912. At first there were two leading candidates, Taft, as the candidate of the conservatives, and Senator La Follette, as the representative of the progressives. La Follette, however, was compelled by illness to cease active campaigning for a time. At this juncture, ex-President Roosevelt, at the invitation of the governors of seven states in which the "insurgents" were particularly strong, announced himself as a candidate for the nomination. At first dignified, the contest later became a warfare of personalities, with charges and countercharges hurled in every direction.

The Republican national convention, meeting in June at Chicago, was controlled by the Taft delegates. It was a scene of turmoil from the first day, the Roosevelt spokesmen contesting the admission of many of the Taft delegates. Most of the protests were ignored, and the Taft delegates were seated. The Roosevelt leaders resisted, and declared that the nomination rightfully belonged to their leader. Defeated on every point by the rulings of the national committee and the chairman of the convention, Elihu Root, the Roosevelt delegates refused to take part in the proceedings of the convention. On its last day they held a mass meeting and nominated Theodore Roosevelt by acclamation as the candidate of a new Progressive party. In August a formal convention ratified the nomination and completed the organization of the party (see PROGRESSIVE PARTY).

The campaign thus became three-cornered, for the Democrats in the meantime had nominated Governor Woodrow Wilson of New Jersey. The defection of the Progressives split the Republican party in two, and practically insured the election of Wilson. The chief features of the campaign were the attacks of the Republicans and Democrats against Roosevelt, and the latter's emphatic replies. In October, while the campaign was at its height, Roosevelt was shot by an irresponsible man in Milwaukee, and was compelled to stop active campaigning. The election gave Taft only eight electoral votes, those of Vermont and Utah, against eighty-eight for Roosevelt and 135 for Wilson. The popular vote was 6,286,214 for Wilson, 4,126,020 for Roosevelt, and 3,483,922 for Taft.

**Other Events.** Two states, Arizona and New Mexico, were admitted during this term, both in 1912. The admission of these was delayed for months because the President vetoed the joint resolution for their admission. He disapproved a provision in the Arizona constitution for the recall of judges, and it was not until that provision was eliminated that he signed the proclamation of admission. The completion and dedication of the Roosevelt Dam in Arizona was an event of national interest. In New York in 1909 was held the Hudson-Fulton Celebration to commemorate the three hundredth anniversary of the discovery of the Hudson River and the centennial of Fulton's *Clermont,* the first steamboat. Another great public playground, Glacier National Park (which see), was opened in 1910.

**An Honored Ex-President.** In the last months of President Taft's administration, public confidence in him seemed to be more or less restored. He took his defeat for reëlection with a calm which was characteristic of him. On his retirement from office he accepted the Kent professorship of law at Yale University, and in the same year was elected president of the American Bar Association. He continued to speak in public on questions of the day, and was on several occasions a severe critic of President Wilson's foreign policy. In 1916 he became chairman of the central committee of the American Red Cross. He was chosen president of the American branch of the League to Enforce Peace (which see), an organization whose object was to prevent, or at least reduce, the possibility of war by threatening to use the combined economic and military strength of the nations of the league against any nation which should make war without first trying negotiation and conciliation. In 1917 he did much to uphold the Wilson administration in its war preparations.

Though not as facile with his pen as Roosevelt, President Taft is a writer of distinction on political and economic subjects. He has written *Four Aspects of Civic Duty; The United States and Peace; Popular Government; Ethics in Service; The Presidency: Its Duties, Opportunities and Limitations,* and other volumes. W.F.Z.

Consult Dunn's *William Howard Taft, American;* Davis' *William Howard Taft, the Man of the Hour;* Wilson's *The Presidents of the United States;* and Mrs. William H. Taft's *Recollections of Full Years.*

**TAGORE,** *ta gohr'*, Sir Rabindranath (1860- ), an Indian (Bengalese) poet, philosopher and religious teacher, winner of the Nobel Prize for literature in 1913. For twenty-five years before this award made his name familiar throughout Europe and America he had been the prophet of Bengal. One of his countrymen said of him that "he is the first among our saints who has not refused to live, but has spoken out of life itself, and that is why we give him our love." His poems, dramas, short stories, novels and essays are all filled with his religious faith. Patriotism is often their theme, but the undercurrent of a simple religious conviction is never concealed. His patriotism won for him the name of "the Soul of Bengal," and his poems and songs exerted much influence in developing a radical and national consciousness.

Whether in his writings for newspapers, his poems or his lectures, whenever he expresses his inmost thoughts, he speaks of essentials, of the things of the soul. He has a marvelous sympathy for the beauties of nature—a cloud, a mountain, a flower, a bird—but in them all he sees God. In all his work there is something of that typical Hindu reverence which led his parents to send him, as a boy of eleven, into the Himalaya Mountains that he might grasp the insignificance of the individual and the grandeur of solitude and space. His language is expressive, and yet unexpected. His poetry creates a picture which stimulates the imagination.

Tagore is primarily the interpreter of the East, and he rarely shows the influence of Western civilization. As a boy of seventeen he was at school in England, and he traveled in other European countries. He acquired an easy command of the English language, into which he has translated many of his own works. His translations are not all of equal merit, but all have the spirit of the original and many have an excellent technique. The most important of them are *Chitra; The Crescent Moon; The Gardener Gitanjali* (Song Offerings); *King of the Dark Chamber; The Post Office;* and *Sādhanā: the Realization of Life.*

In 1916 Tagore lectured in America on the subject of "Internationalism."

**TAHITI,** *ta he'te,* **ARCHIPELAGO.** See Society Islands.

**TAHOE,** *ta'ho,* or *tah'ho,* a beautiful glacial lake on the boundary between California and Nevada, the largest body of water in the Sierra Nevada range. The mountains of two states, those on the Nevada shore, gray and rugged, and those on the California side, stately and verdant, are mirrored in its dark blue waters. The outlet of the lake is in the rushing Truckee River, which carries the overflow to a "sink" known as Pyramid Lake, where the water evaporates. The woods of the adjacent slopes are filled with game, and the lake and swift mountain torrents abound with fish, making the region a paradise of the sportsman as well as the delight of the tourist. Lake Tahoe is a popular summer resort, and in its vicinity are many attractive homes and fine hotels. The lake is oval shaped, and is about twenty miles long and half as wide. It has an elevation above sea level of 6,225 feet, and an average depth of 1,500 feet.

**TAIL'OR BIRD,** a song bird of India, Malaysia and the Philippines, so named from its habit of enclosing its nest within a large leaf, which it sews together at the edge with its slender bill. The nest itself is made of plant down, fine grass, hair, etc. The eggs are three or four in number, varying in color from reddish-white to bluish-green, boldly marked with brownish-red. This bird has back plumage of olive-green, white underparts and a chestnut crown. The nest is ingeniously sewed together with bits of silk or wool threads or with vegetable fiber, which the bird searches for most diligently.

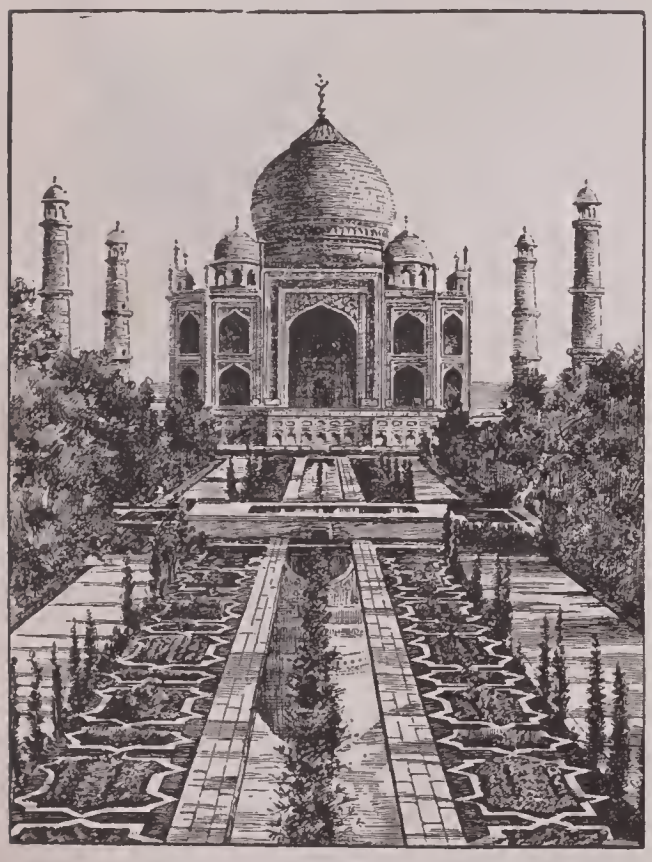
TAILOR BIRD AND NEST

**TAINE,** *tayn,* Hippolyte Adolphe (1828-1893), a French historian and critic, born at Vouziers. He was a student from his childhood, and by the time he was fourteen years old he had drawn up a schedule for his day's work to which he held rigidly—twenty minutes for play in the afternoon, an hour for music after dinner, and all the rest of his waking hours for study. The results of his intense application were seen when he entered the École Normale, where he speedily distinguished himself. In 1851 he was made professor of philosophy in the College of Toulon, but he soon

resigned the position to give his time to study and literary production.

In 1864 his celebrated *History of English Literature* appeared; this has been translated into many languages, and it ranks as one of the greatest works of its kind. In the same year he was appointed by the government, which had previously feared him because of his attitude toward Napoleon III, to a professorship in the École des Beaux Arts, where he distinguished himself by a series of excellent lectures on art. He continued to write critical studies on literature, art and history, producing in the last fifteen years of his life his great work, *Origins of Contemporary France,* in which he discussed the causes of existing conditions in France. In 1878 he was made a member of the French Academy. Taine was above all things logical, and all of his work is marked by the most accurate analysis.

**TAJ MAHAL,** *tahj ma hahl',* the costliest private tomb in the world, built by the Indian ruler Shah Jehan as a final resting place for the



THE TAJ MAHAL

Some buildings take on added beauty under the rays of a brilliant moon or in the light of the setting sun. Of the Taj Mahal it has been said that it "requires neither moonlight nor sunset; it brings its own atmosphere, its own light, 'that was never yet on land or sea.'"

remains of his favorite wife, Mumtaz-i-Mahal, "the pride of the Palace." The name *Taj Mahal* is the Persian for *crown of Mahal.* This mausoleum, which is accounted by some critics to be the most beautiful building ever constructed, is one mile east of Agra, and its erection covered a period of twenty-one years (1629-1650). It is built entirely of white alabaster, and is believed to have cost over $9.000,000.

It stands on a rectangular platform, from the four corners of which rise slender minarets, or prayer towers. The building itself is an octagon, 130 feet in length and width and seventy feet high. Above the central portion an exquisite dome rises to a height of 100 feet. The outside of the mausoleum is adorned with passages from the *Koran* and ornamental designs in inlays of costly gems, and within is a central chamber containing two cenotaphs, which the spectator views through an alabaster screen of beautiful openwork. Below this chamber is the vault wherein repose the remains of Shah Jehan and his wife.

No artificial lighting is needed for the interior, for the dome is semitransparent, and there are several windows with perforated alabaster screens. Through these the light glows with a marvelously softened effect. The structure is surrounded by a beautiful walled-in garden, the entrance to which is a superb gateway of red sandstone and white marble.

**TALC,** *talk* (short sound of *a*), a soft, magnesian mineral found in flat, smooth layers or plates in crystalline rocks. It is colorless, or of a greenish- or yellowish-white hue, shading to an olive-green, and is generally translucent. The thin plates are transparent and in China and India are used as a substitute for window glass. In its granular form it feels soft and soapy. Common talc is used in the manufacture of crayons and porcelain. *French chalk,* a fine, granular variety, is used for tracing lines on wood or cloth.

The United States produces more talc than all of the rest of the world, and in recent years the output has nearly doubled. It is found chiefly in the Blue Mountain region of the Atlantic states and in the hills of New England, and is generally mined in small fragments by underground methods. The state of New York produces over one-half of the total output, far outranking all other states except Vermont; in the latter state the industry has recently shown a marked development, and the annual production is now more than one-half that of New York. Smaller quantities are found in New Jersey, Pennsylvania, Georgia, Massachusetts, Virginia and North Carolina; the deposits of Southern California have attracted attention.

In 1914 the output in the United States of marketed talc was 151,088 tons; including soapstone, an impure, massive form of talc, it amounted to 172,296 tons. Canada produced in that year 10,808 tons, about one-half of which was exported to the United States. Talc of the higher grades, such as is used in the manufacture of toilet powders and gas tips, is imported chiefly from Italy and France. Smaller quantities are obtained from Austria-Hungary, England and Germany and a little from Japan.

**TAL'ENT,** a famous ancient coin and unit of weight. Because the best-known references to this ancient term are found in the Scriptures there frequently exists the impression that it was the Hebrews who chiefly made use of the talent, but such is not the case. The word occurs in the Greek of the New Testament, and it is in connection with Greek affairs that the measure is chiefly known. The Hebrews, however, did have such a weight, derived from Babylonia, which was equal to 3,000 shekels in silver, or between $1,800 and $1,920.

Like the Hebrews, the Greeks took the talent from the Babylonians, though the name is Greek. Both in measuring weights and in giving the denomination of money the talent was the largest Greek unit, but it was by no means uniform in different Greek states and at different times. The talent used for measuring gold, moreover, differed from that for measuring silver, and to understand references in Greek literature to talents it is necessary to know which of the various systems is intended. Perhaps the most commonly referred to, however, is the later Attic or Solonic, which was equivalent to fifty-six pounds fourteen ounces. A silver talent in Athens was worth between $1,000 and $1,100.

The Romans also made use of the talent, not as a coin but as a measure of money. They had a *great talent* and a *little talent,* the former worth about $480, the latter about $363.

The common present-day use of the word, meaning a special endowment or faculty, is derived from the parable of the talents in *Matthew* XXV.

**TAL'ISMAN,** The, a prose romance by Sir Walter Scott, the scene of which is laid in Palestine during the Third Crusade. Richard Coeur de Lion, king of England, appears, as does his enemy, Saladin, who saves the English king's life by means of the "talisman"—a magic stone which is guaranteed to cure fevers. The hero is the prince royal of Scotland, who takes part in the Crusade disguised as Sir Kenneth, the Knight of the Leopard. *The Talisman* is one of the most popular of Scott's novels.

**TALKING MACHINE,** *tawk'ing ma sheen',* a wonderful device for recording and reproducing sound, and particularly human speech. Within a very few years it has been advanced from the status of a plaything to a place of vast importance in the world; so quickly was it accepted by the people as an article to provide amusement that few yet realize that it is one of the most valuable of the world's inventions. It would merit a place in every home if its only mission were to furnish wholesome entertainment, but, like the moving picture, it is destined to be linked with history, with art, with music, for all time to come.

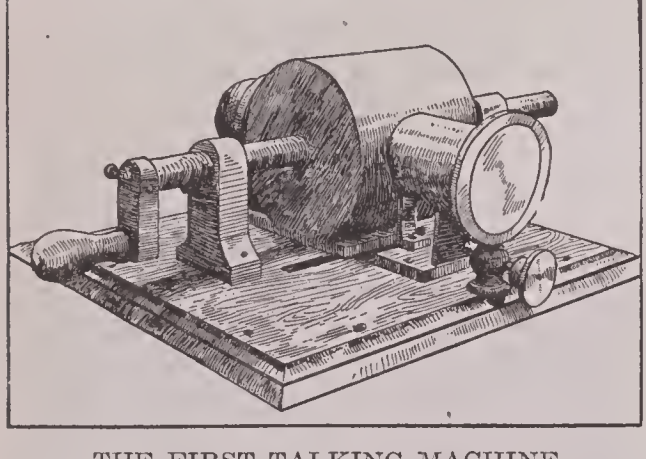
If every school child could to-day hear the voice of Abraham Lincoln delivering the imperishable 267 words of the Gettysburg Address, and on the moving-picture screen see him stand as on that occasion; could they hear the voice of Jenny Lind as their grandfathers heard it; could they hear the quieting words of Garfield, "God reigns, and the government at Washington still lives," uttered in New York the day after Lincoln's death; could they listen to the voice of Washington as he gave his country sage counsel in his Farewell Address; could British children hear to-day the ringing tones of Fox, Burke, Disraeli, Gladstone, which did much to shape the destinies of races—could there be chosen from a thousand "records" the spoken words which marked an epoch or decided great destinies, the past would possess a significance that the printed page never can give it. "You may fire when ready, Gridley," proclaimed preparedness, but we would experience a greater thrill of pride if we could hear the calm, unimpassioned, confident voice of Dewey on that May morning in Manila Bay.

Children a hundred years from now are to have rich experiences, because with the talking machine and the moving picture they are actually to hear things and see things which made history before they were born. They may hear the voice of Woodrow Wilson appealing to Congress for war in 1917; they will see in moving pictures the nation-wide response to that appeal. They will read in the books of that day of statesmen rising to oratorical heights in great crises, and will hear from the "records" those impassioned utterances. There will be great singers in that day, but probably few greater than Caruso, Melba, Homer and others of the present, and these will live then as now in the perfect talking-machine record.

Sarah Bernhardt rejoiced when she was asked to present a play for the moving pictures, for, she said, "Now I shall live a thousand years." Her voice will as long delight her countrymen and lovers of her supreme art everywhere, for she has spoken her "lines" into the "records."

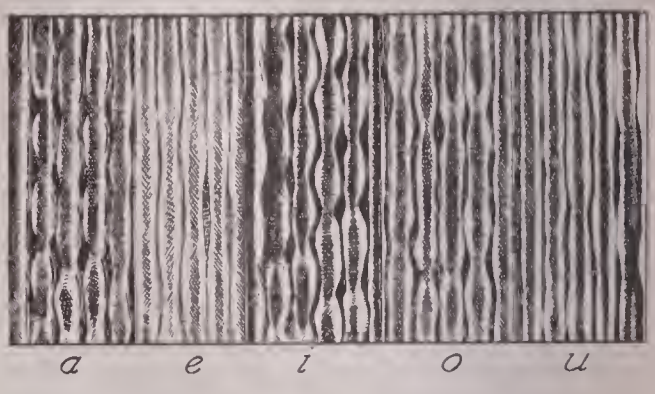
Furthermore, the talking machine is going to preserve spoken languages that are dying out, and also the present-day speech and folklore of American Indians. Students of foreign languages are aided in the mastery of pronunciation by "records" made for the purpose. The talking machine is rapidly entering the business world; the business man dictates his letters into the machine, and later the typist listens and writes. In the home it will be possible to preserve the voices of father, mother, brother and sister against the day when they will be absent forever.

Thomas A. Edison was the pioneer in the development of a practical talking machine, though the basic idea did not originate with him. In 1877 he brought out the first *phonograph,* which, as now perfected, operates on the following plan: Impressions of the sounds to be recorded are made on a wax-covered cylinder which revolves against a sharp needle point, or stylus, attached to a thin metallic diaphragm. The diaphragm, which is mounted on a carriage, is set in motion by the impulses of the voice or mechanism producing the sounds, and as it vibrates the stylus cuts into the wax small indentations or grooves, which travel in a spiral around the entire length of the cylinder. The reproduction of the sounds is accomplished through the medium of another diaphragm carrying a needle which follows the grooves already made in the wax. In the later type of talking machine the sounds were reënforced by means of a trumpet-shaped horn, and at a still later date the horn was abandoned.



THE FIRST TALKING MACHINE
The original Edison machine, invented in 1877.

The original Edison machine was provided with a cylinder covered with tin foil; the wax cylinder was the invention of Chichester A. Bell and Charles S. Tainter, who brought out the so-called *graphophone* in 1885. The graphophone, in brief, was the first phonograph in which a wax cylinder was used. In 1887 appeared the *gramophone,* the invention of Emile Berliner. This instrument made use of a disk instead of a cylinder, while the stylus cut on the disk a zigzag groove of the same depth throughout instead of one of varying depth. The *Victor Talking Machine,* the *Disk Graphophone* and the *Columbia Phonograph* are all patented forms of the original Berliner instrument. Though the first Edison machines were provided only with cylinder records, both cylinder and disk models are now manufactured by the Edison Company, and the old distinction between *phonograph* and *gramophone* has been lost. In fact, the tendency now is to designate a talking machine, whether of the cylinder or disk type, by its special trade name.




THE RECORD OF A TENOR VOICE
Part of a record, as seen through a powerful microscope. The differences in the curves show the differing indentations made in singing the vowel sounds. In reproducing these sounds the needle passes over these indentations and vibrates exactly as did the stylus which made the curves.

The improvements adopted by the various manufacturers of these instruments are numerous and ingenious. The more expensive machines are handsome pieces of furniture, made of expensive woods and sometimes adorned with elaborate carving or painted designs. The old-fashioned horn for reënforcing the sound is replaced by a chamber under the instrument, in which there is a sounding board resembling that of the piano. Electric motors are a modern improvement over the hand-turned crank, and there are other devices for regulating the volume and *tempo* of the sound. Indestructible diamond needles are used on many machines, and are considered an improvement over the steel or wooden needle that has to be changed frequently. The manufacture and duplication

of cylinder and disk records to supply the increasing demand for these articles has become a mammoth and profitable industry, and one that has called into service the highest technical skill. Popular singers whose voices are recorded are paid on the basis of royalties, and incomes from this source run into thousands of dollars a year.

Talking machines may be bought for $15.00 or less which are more perfect than the best instruments made about the year 1900. From this low price the cost of more elaborate machines varies from $50 to $500. G.B.D.

**TALLADEGA,** *tal a de' ga,* ALA., the county seat of Talladega County, situated in the north-central part of the state sixty miles east of Birmingham, the largest city in the state. It is served by the Southern, the Birmingham & Atlantic and the Louisville & Nashville railroads. Talladega is a trade center for white marble, and contains cotton and cottonseed-oil mills, a chemical plant and manufactories of hosiery and fertilizers.

Here are located state schools for the deaf, dumb and blind, Talladega College (Congregational) for colored students, a Presbyterian college for young ladies and an orphans' home under control of that denomination. The city also contains a Carnegie Library. Talladega is located on ground that was the scene of a battle fought in 1813 between Creek Indians and an American force under General Jackson. In 1911 the commission form of government was adopted. Population in 1910, 5,854.

**TALLAHASSEE,** *tal a has' e,* FLA., the state capital and the county seat of Leon County, centrally situated in the northern part of the state, 165 miles west of Jacksonville and 204 miles east of Pensacola. Railroad service is provided by the Georgia, Florida & Alabama and the Seaboard Air Line roads. In 1910 the population was 5,018.

Tallahassee is situated in a semimountainous country made attractive by abundant tropical vegetation and several beautiful lakes. The surrounding section is an agricultural district producing cotton, tobacco and sugar cane. The important industrial establishments of the place are manufactories of cottonseed oil, lumber, iron products, cigars and naval stores. The city is the seat of the Florida State College for Women and of a state normal school. Here also is located the Florida Agricultural & Mechanical College (colored), a part of the equipment of which is the Carnegie Library. The governor's mansion, supreme court library, state public library, Federal building and Elks' Club are the most notable buildings. Charles Louis Napoleon Achille Murat (the eldest son of the famous French cavalryman who was king of Naples from 1808 to 1815) came to America about 1821 and made his permanent home two miles west of Tallahassee. In 1826 he married the daughter of Col. Bird C. Willis of Virginia. Both he and his wife are buried in the Catholic cemetery at Tallahassee.

The Seminole Indians who originally occupied this territory were expelled, and a settlement was made here about 1818. It became the capital of the territory of Florida in 1824, and remained the state capital after the admission of Florida into the Union in 1845. Before the War of Secession, Tallahassee was a social center and residence city for wealthy Southern planters. F.R.S.P.

**TALLEYRAND-PÉRIGORD,** *tah leh rahN' pa re gohr'* (in English, *tal' i rand*), CHARLES MAURICE, Duke de, Prince of Benevento (1754-1838), a famous French statesman, born in Paris, and, next to Napoleon, the leading political character of his time. Though an eldest son, he was forced by lameness, which resulted from an accident in his childhood, to give up a military career, and was destined by his family for the Church. At Saint Sulpice, where he was trained, he showed neither inclination nor aptitude for religious life, but continued his studies, however, and in 1775 was ordained. In 1780 he was made agent-general of the clergy of France, and in that position showed the administrative ability which in 1789 secured his appointment as bishop of Autun. In that same year he was elected deputy to the States-General from Autun, and at once took rank as one of the foremost reformers.

**Supported State above Church.** He was one of the committee appointed to draw up a constitution and was a signer of the Declaration of Rights, and by his advocacy of the confiscation of Church lands won great popularity. Because he took the oath to the constitution and acknowledged the supremacy of the State he was excommunicated by the Pope in 1791, and in that same year resigned his bishopric. Meanwhile he had been a founder of the Friends of the Constitution, afterward the Jacobin Club, and had, in 1790, been elected president of the National Assembly; but like Mirabeau, with whom he usually identified himself, he was not violent enough to please the radicals, and gradually lost influence. Thus, while in England on a diplomatic mission in 1792, he was declared

to be one of the *émigrés* of royalist tendencies, and was forbidden to return to France. For two years he remained in England, then went to the United States, where he spent nearly three years.

**Napoleon's Strong Aid.** In 1796 he was allowed to return to France, and through the influence of Madame de Staël-Holstein secured the post of minister of foreign affairs. He saw that Napoleon was the coming man in the country, aided in the moves by which the Directory was overthrown and the consulate established, and as a reward was continued in his position as foreign minister. In this office he exerted himself to extend the power of Napoleon, who made him grand chamberlain in 1804 when the Empire was founded. Talleyrand was the chief spirit in the formation of the Confederation of the Rhine and in the negotiations with Prussia and Russia which, in 1807, culminated in the Peace of Tilsit. Soon after this he resigned his office, and during the later years of Napoleon's reign became the rallying center of the discontented spirits who hoped for a return of the old monarchy. He drew up the terms of Napoleon's abdication, and at the Congress of Vienna made use of his unusual diplomatic powers to obtain concessions for France.

After Louis XVIII was established on the throne Talleyrand took little part in public affairs, but when Louis Philippe became king by the Revolution of 1830 he was sent as ambassador to England and succeeded in forming the quadruple alliance of France, Great Britain, Spain and Portugal. This was his last important public act. Before his death he was reconciled to the Church.

**Estimate of His Life.** Talleyrand's name has come to stand for all that is underhanded in public affairs, and much censure has been heaped upon him because he enriched himself at the expense of the state. It is probable that in many instances he was misjudged, but in any case it is true that he piloted France several times through troubled waters when no one else could discern the wise course. A.MC C.

Consult Lacombe's *Talleyrand, the Man;* McCabe's *Talleyrand: A Biographical Study.*

**Related Subjects.** The following articles in these volumes will make clear certain references in this sketch of Talleyrand:

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|---|---|
| Directory | Napoleon I |
| Émigrés | Staël-Holstein, Baroness de |
| Jacobins | States-General |
| Mirabeau, Count de | |

**TALLOW,** *tal'o,* a hard, white substance obtained in the process of rendering animal fat, especially that of sheep, goats and cattle. It is used extensively in the manufacture of soap, candles and lubricants, and for dressing skins and leathers; that which is of superior quality is employed in the making of oleomargarine.

Tallow is a mixture of the solid fats palmitin and stearin, and of the liquid fat olein. When pure it is whiter than lard and practically tasteless, but the commercial product usually has a yellowish tinge. It will not dissolve in water, but is soluble in boiling alcohol. The best grade is obtained from fat near the kidneys of cattle. In one process of tallow making the suet is cut into small pieces and heated over water until the fat has melted; it is then tried out. The tissues that are left are pressed to obtain the tallow that may remain. Acid rendering consists in boiling the fat with water and sulphuric acid, which causes the tissues to dissolve. Tallow is also produced by melting the suet in iron cylinders heated by steam under pressure. A substance similar to animal tallow is obtained from certain trees. See TALLOW TREE.

**TALLOW TREE,** the name of various trees which produce a waxlike substance that may be used like tallow for making candles. The tallow tree of China, which is the most widely distributed, has been introduced into North America and is becoming naturalized along the coasts of Georgia and the Carolinas. At the approach of winter the long, leathery leaves become a deep red, and among them hang the seeds, suspended by waxlike threads. The tallow, or wax, is obtained by crushing and boiling both capsules and seed, and skimming off the tallow as it rises. This substance is afterwards melted and refined, and ordinary wax is added to give a firmer consistency. It is used chiefly for candles, but a scented soap of good quality is also made from it, as it emits a balsamic odor. The leaves furnish a black dye, and the stem yields a resinous substance called *copal,* used in making varnish. The *bayberry,* or *candleberry* (which see), a small tree or shrub, also furnishes wax used in making candles. These burn slowly, but do not give a strong light.

**TALMAGE,** *tal'mayj,* THOMAS DE WITT (1832-1902), one of America's greatest clergymen and orators, was born at Bound Brook, N. J., educated in New York University and the Dutch Reformed Theological Seminary at New Brunswick, N. J., and in 1856 was ordained pastor of the Dutch Reformed Church, Belleville, N. J. He began immediately to attract

notice through his remarkable oratory and fearless statements, and soon received offers of other pulpits. In 1859 he accepted the pastorate of the Dutch Reformed Church at Syracuse, N. Y., and three years later went to the church of the same denomination at Philadelphia. While holding this position he was permitted by his congregation to become a chaplain in the Union army, and was most energetic in caring for the physical and spiritual welfare of soldiers in Pennsylvania, Maryland and Northern Virginia.

In 1869 he accepted the position of pastor of Central Presbyterian Church, Brooklyn, N. Y., and within one year the congregation had become so large that an immense structure known as the Brooklyn Tabernacle was erected. There his eloquence and bold denunciation of existing evils attracted such audiences that even the new building was often uncomfortably crowded. He was in great demand as a lyceum lecturer and was so frequently absent from his pulpit that Josh Billings once mentioned in his *Allminax* as one of the remarkable events of the year that "Talmage spoke in Brooklyn Tabernacle." His influence as a public leader was increased not only by this lyceum work but by the weekly publication of his sermons in more than 3,600 city and country newspapers.

Between 1872 and 1894 the Tabernacle was burned three times, and after the third fire Dr. Talmage resigned. The following year he accepted the pastorate of the First Presbyterian Church at Washington, D. C., but resigned in 1899 to devote his time to writing. He was author of such popular religious books as *Every Day Religion, The Almond Tree in Blossom* and *From Manger to Throne.*

**TAL'MUD,** the book of Jewish civil and religious law, aside from the Pentateuch. It had its beginnings in the time of Ezra, the period following the Exile, when new conditions of national life called for new laws. Decisions were made from time to time by those in authority, which, as centuries passed, grew into the mass of tradition known as the *Oral Law.* In the times of Jesus the scribes and Pharisees required strict observance of all the details of this law, but the Sadducees opposed it, declaring their only authority to be the Pentateuch. After the rise of Christianity and the destruction of Jerusalem by the Romans, pious Jews turned their zeal toward putting the Oral Law into writing. This work was completed at the close of the second century and formed the part of the Talmud known as the *Mishna,* meaning *instruction.* After this, scholars commented on the *Mishna,* preserving their work in the second part of the Talmud, known as the *Gemara.* There are, in reality, two *Gemaras* extant, the Palestinian and the Babylonian, the latter being the larger and more trustworthy. It was completed in the sixth century. The *Mishna* was written in Hebrew; the commentaries, in Aramaic.

These Jewish works, though opposed to Christianity, did much to stimulate Christian thought of the Middle Ages and must be given a part of the credit for the German scholarship that made possible the Protestant Reformation. Students to-day find in them much interesting matter concerning Jewish manners and customs in Bible times. See HEBREW LANGUAGE AND LITERATURE.

Consult Rodkinson's *History of the Talmud.* Darmesteter's *The Talmud* is an English translation.

**TALON,** *ta lohN',* JEAN BAPTISTE (1625-1691), a French official in Canada, one of the ablest of the men who created New France. After serving in the civil service of France for some years, he was in 1665 appointed "intendant of justice and finance" for the French possessions in North America. Talon was able and energetic. He built a ship at the king's expense, in order to show the people how to build ships. He sent out engineers to search for coal, copper, lead and other minerals, and he himself made shoes and woolen cloth as an example to the colonists. He also gave much aid and encouragement to the Jesuits in the explorations and missionary enterprises on the shores of the Great Lakes. One of his orders provided that bachelors should not hunt, fish or trade with the Indians, the obvious purpose of this order being to encourage permanent settlement by families. A book by Talon, *Mémoire à Sa Majesté sur l'état Présent du Canada,* published in 1667, is a valuable record for the history of New France.

**TA'LUS.** At the foot of every cliff or large ledge there is a heap of loose rocks that have been broken from the large mass or face of the cliff. The name *talus* has been given by geologists to such heaps. The fragments forming the talus are broken off by weathering and by the action of water, which in cold climates is the most powerful agent. Water enters the crevices in the rock, where it freezes; in freezing, it expands and makes the crevice larger. This process is repeated each winter until, finally, a large fragment is broken from its bed and falls to the foot of the cliff.

A new talus contains large fragments of rock and has a steep slope, but an old talus is usually composed of fine particles, and has a gentle slope. In such a talus we can easily trace the transformation of rock into soil. See Erosion.

**TAMAQUA,** *ta maw' kwah,* Pa., a borough in Schuylkill County, situated in the eastern part of the state about midway between its northern and southern borders, and on the Little Schuylkill River, ninety-eight miles northwest of Philadelphia. The Central of New Jersey and the Philadelphia & Reading railroads provide railway transportation, and electric lines communicate with adjacent cities and towns east, west and south. This locality is noted for its immense deposits of high grade anthracite coal, and the leading industry of the city is the mining and shipping of this product. The manufactories include powder mills, hosiery factories, foundries and lumber mills. Tamaqua has a library and a state hospital. The place was settled in 1799, was organized in 1829, and was incorporated as a borough in 1833. The population increased from 9,462 in 1910 to 10,840 in 1916 (Federal estimate). *Tamaqua* is an Indian name which means *running water.*

**TAMARACK,** *tam' a rak,* the name applied in the Western and Southern United States to the *larch.* In New England and Canada it is known by the local name *hackmatack.* The tree is described under the title Larch.

**TAMARIND,** *tam' a rind,* a large, tropical tree of the pulse family of plants, cultivated for ornament and utility. Its fruit, a brown pod from three to six inches long, is filled with an acid, juicy pulp which is used in India to make cooling beverages, such as sherbet. This pulp is shipped in large quantities to European countries, being packed in layers in casks. Boiled in sugar or syrup, it becomes the preserved tamarind of commerce. Tamarind seeds are used to make a yellow or red dye, and the root of the tree furnishes a beautiful hard wood, valued for cabinet work, though fashioned with difficulty. The tree itself is very attractive, with wide-spreading branches and light green foliage. It is widely distributed in warm countries, but has not been successfully cultivated anywhere in the United States except in Florida.

**TAMBOURINE,** *tam buh reen',* a musical instrument constructed on the principle of a drum, consisting of a circular wooden or metal frame about two inches deep, across the top of which is stretched a piece of tightly-drawn parchment. Little bells are attached to the hoop, and these jingle when the parchment is struck. The tambourine has no musical pitch, but is used merely to beat rhythm. The performer plays it by striking it with the knuckles or elbow. Spanish and Italian peasants and gypsies of all sorts use it for their dances, and it is invariably found in Salvation Army bands. This instrument is similar to the *timbrel* of the Old Testament.

**TAMERLANE,** a form of the name of the conqueror Timur (which see).

**TAMMANY,** *tam' a ni,* **SOCIETY,** or The Columbian Order, was founded in New York City, May 12, 1789, by William Mooney, two weeks after the government of the United States was established. Mooney had been a soldier of the Revolutionary War, and he started the organization as "a fraternity of patriots solemnly consecrated to the independence, the popular liberty, and the federal union of the country." The original members were those who, before the war, had been members of the "Sons of Liberty" and "Sons of Saint Tammany," societies which were organized to promote the cause of independence.

The organization of the society was by tribes, one for each of the thirteen states. The nomenclature was selected from Indian words and phrases, the name of Tammany being adapted from that of an Indian chief whom tradition credited with great wisdom and with respect for white people. The members were called *braves,* the place of meeting was the *wigwam,* the thirteen states were named *Eagle, Panther, Deer,* etc. The head officer of each tribe was a *sachem,* and the head of the national organization was the *grand sachem.* The honorary title of *very grand sachem* was conferred upon Washington and his successors for a time, but was abolished at the close of Jackson's administration. The master of ceremonies was called *sagamore,* and "Freedom our Rock" was adopted as the society's motto. The Tammany Society always fought for manhood suffrage and against imprisonment for debt.

In the first years of the country's history, the government tried, but failed repeatedly, to conclude a treaty of peace with the warlike Creek Indians. The Tammany Society undertook the task of conciliation, and brought the chief and twenty-eight of his warriors to New York City for a banquet, in August, 1790. Then the members of Tammany, themselves dressed in full Indian costume, escorted the Creeks to a conference with President Washington. The result was the signing of a treaty the next day.

The New York Historical Society, the Academy of Design and many other educational institutions were founded or fostered by Tammany. On April 13, 1808, the Society marched in a body to Wallabout Bay, and laid the foundation stones for a mausoleum, where they later deposited the bones of 11,600 Revolutionary patriots. In the War of Secession the grand sachem of Tammany, William D. Kennedy, led a regiment composed of members who were equipped by the organization. It would be difficult to record even a small part of the interesting and worthy exploits of this society during its early history.

**The Society in Politics.** Although the organization existed for many years for patriotic purposes, it soon came to have a political significance. For many years it led practically a twofold existence—patriotic and political—with the leadership of both elements in the same hands. Tammany Hall, the home of the Society, was eventually leased to the political element in its membership, with the privilege also of using the Society's name. For a time there was a nominal connection between the two wings, but for nearly fifty years Tammany has been recognized solely as a political machine, wielding vast power, perfect in its organization, and determined to control the government of the city and state of New York.

Numerous scandals have darkened its history, the most notable one occurring in 1871, when Tammany Hall was under the leadership of William M. Tweed. Far-reaching bribery and corruption were charged against the organization and Tweed was eventually sent to prison. About twenty-five years later, under the leadership of Richard Croker, the power of Tammany spread until its influence was felt in national affairs. However, its effort to dominate national politics has never been successful. Such notoriety surrounded the last years of Croker's reign that he preferred a residence in Great Britain rather than continue in the turmoil of New York politics.

His successor in the leadership was Charles F. Murphy, under whom Tammany has been both the victor and the vanquished in election contests; but fully half of the time since the days of Croker, Tammany has had control of the administration of affairs in the city of New York and has at times dominated the legislature at Albany. In 1913 it met with the most serious defeat of a decade when its candidates for office in New York City were so badly defeated by the ticket headed by John Purroy Mitchel (born 1879) for mayor; four years later it defeated Mitchel.

The present Tammany Hall exists because of its influence over the hordes of people on the East Side of New York City and across the river in Brooklyn, a part of Greater New York. Tammany holds the fealty of this great mass of voters by reason of its almost paternal care of what they believe to be their material interests. C.H.H.

Consult Kilroe's *Saint Tammany and the Origin of Society of Tammany, or Columbian Order of New York.*

**TAM'PA,** Fla., a winter resort on the western coast of the state, and the county seat of Hillsboro County. It is situated on an inlet of Tampa Bay at the point where it receives the Hillsboro River. Jacksonville is 212 miles northeast. Transportation is provided by the Atlantic Coast Line, the Seaboard Air Line, the Tampa Northern and the Tampa & Gulf Coast railways, by steamer lines which operate to Key West, the West Indies and important Gulf and Atlantic ports, and by lines operating between Tampa and Port Tampa. The population increased from 37,782 in 1910 to 53,886 in 1916 (Federal estimate). Tampa ranks second among the cities of the state, Jacksonville holding first place.

Tampa has the best harbor on the western coast of Florida. By water and by rail, the city sends out large shipments of fruits, vegetables, lumber, rosin, fish, cattle, wheat, flour, turpentine and phosphate. The most important industry is the manufacture of cigars. Although Florida raises a superior grade of tobacco, most of the supply used in the cigar factories of the city comes from Havana. About 10,000 people, mostly Cubans, are employed in the cigar factories, and about 300,000,000 Havana cigars, the greater part of the world's supply, are made here annually. The fishing industry and the manufacture of fertilizer are also important.

Owing to its delightful location and its healthful climate, Tampa has become a favorite winter resort, and its fine hotels are among its most notable buildings. The magnificent Tampa Bay Hotel, which was erected at a cost of $5,000,000, is owned by the city and operated under lease. It is one of the largest tourist hotels in the United States. Tampa has a handsome Federal building, a customhouse and a number of fine church, school, bank and office buildings. In addition to the public schools there are the Jesuit College, the Holy Name Academy, for girls, and a Carnegie Library.

The settlement of Tampa began with the establishment of an army post called Fort Brooke, about 1850. During the War of Secession it was taken by the Federals, when it was only a small shipbuilding center. Here, in De Soto Park, the United States Volunteers encamped during the Spanish-American War. In 1886 railroads were constructed to the city, the tobacco industry was established, Tampa became a port of entry, and the city charter was granted. From that time its growth was rapid. L.P.D.

**TAMPICO,** *tahm pe' ko,* the most important center of oil production and one of the leading seaports of Mexico, situated six miles from the Gulf of Mexico near the mouth of the Pánuco River, and 206 miles northeast of Mexico City (see map, opposite page 3768). It is located in the state of Tamaulipas, and occupies the site of an ancient Aztec city. Though Tampico suffers from a hot, humid, unhealthful climate, the place has experienced a remarkable growth because of the development of the rich oil fields in the vicinity. During the War of the Nations the Tampico wells provided nearly all of the oil used by the British navy, and it was the necessity for closely guarding this valuable source of supply that induced President Wilson to lift the embargo on the export of ammunition into Mexico, in the summer of 1917. The business section of the city has broad, well-paved streets, fine public squares and substantial buildings, and good drainage and sewerage systems and gas and electric light plants have been installed. In 1914 Tampico came prominently into notice as the scene of the insult to the American flag that almost caused war between Mexico and the United States (see MEXICO, subtitle *Government and History*). Population, estimated, 35,000.

**TANAGER,** *tan' a jer,* a family of American birds noted for the brilliance of the male plumage. They are from six to eight inches long, and are usually found in the forests, where they feed on insects, fruit and flowers. The three hundred and fifty known species dwell chiefly in the tropical regions of Central and South America, and only four or five species reach the United States in their migrations northward. Of these the best known is the *scarlet tanager,* which nests as far north as New Brunswick. The male has bright scarlet plumage, with velvety black wings and tail, and the female is pale yellow below and olive-green above, with darker wings and tail. The nest is a frail, saucer-shaped structure placed near the end of a horizontal limb, and the eggs, three or four in number, are pale bluish-white or bluish-green, with reddish-brown markings. The scarlet tanager has a loud, cheery singing note something like that of the robin.

A familiar summer bird of the Southern states is the *summer tanager,* easily recognized by its

SCARLET TANAGER

rose-red plumage. It has much the same nesting habits and song as its scarlet-coated relative. Another interesting species is the *Western tanager,* found in summer from the Rockies to the Pacific coast. The male of this group is bright yellow, with black back, tail and wings and crimson head.

**TANANARIVO,** *tan nah na re' vo,* or **ANTANANARIVO,** the capital of Madagascar, the seat of the French authority over the island, is situated well inland, on a plateau at an elevation of over 4,000 feet. It is not an attractive city; the streets are very irregular, and the buildings are constructed almost entirely of wood. The only building of note is the former royal palace, the residence of the queen before her exile in 1896, when France took formal possession of the island, dropping the pretense of its former protectorate (which see). The inhabitants manufacture coarse textile fabrics and a few other simple necessities, but the inland position of the city, combined with poor facilities for transportation, restricts the commerce. However, two railroads to the coast from the capital are being slowly constructed, to the extreme north at Antsirane and to the east at Tamatave. Population, about 72,500. See MADAGASCAR.

**TANCRED,** *tang' kred* (about 1050-1112), prince of Antioch. With his cousin Bohemund he joined the First Crusade, swore allegiance to Alexius, the Greek emperor, and took active part in the siege of Antioch. He soon joined himself to Godfrey of Lorraine, and in 1099 assisted in the capture of Bethlehem. During

the siege of Jerusalem he secured much booty and strengthened his power, shortly thereafter being made prince of Galilee. Between the years 1100 and 1103 he served as regent of Antioch during Bohemund's captivity. Two years later the power was restored to Tancred, who had by this time also secured possession of the government of Edessa. In 1107 his strength wrested Cilicia from the Greeks, and constantly his attacks were directed against Northern Syria. Tasso has immortalized the name of Tancred in his famous *Jerusalem Delivered.*

**TANEY,** *taw'ni,* ROGER BROOKE (1777-1864), one of the most famous Chief Justices of the United States Supreme Court, the jurist who gave the decision in the famous Dred Scott Case (see DRED SCOTT DECISION). This verdict was one of the important factors in the anti-slavery struggle that helped to bring on the War of Secession. Taney was born in Calvert County, Maryland, and was educated at Dickinson College (Pennsylvania). After studying law in Annapolis he was admitted to the Maryland bar in 1799, and a few years later established himself in Baltimore. President Andrew Jackson appointed him Attorney-General in 1831, and in 1836 he succeeded John Marshall as Chief Justice.

**TANGANYIKA,** *tahn gahn ye'kah,* the longest fresh-water lake in the world, and one of the deepest, situated in the east-central part of Africa, 175 miles southwest of Victoria Nyanza (see map, opposite page 81). It is 400 miles in

LOCATION MAP

The long, narrow lake is Tanganyika; above, to the northeast, Victoria Nyanza; below, one-half visible, Nyassa. The small corner map shows in the black area the part of the continent appearing in the larger map.

length, and but twenty to forty miles in width, and its area is over 12,000 square miles. It is one and a half times as large as Massachusetts. The waters of Lake Tanganyika reach the Congo River by way of the Lukuga, which flows from it on the west, and the lake is fed by several small streams whose sources are in the surrounding mountains. Profuse growths of tropical plants are found on its shores, and its waters abound in fish, crocodiles and hippopotami.

Tanganyika was first viewed by Europeans in 1858, when the Arabian town of Ujiji, on its eastern shore, was visited by the Burton and Speke expedition. It was at this place, in 1871, that Dr. Livingstone was found by Stanley. The latter explored the whole lake in 1876. Great Britain, Germany and Belgium have established stations on the shores of the lake, and the Germans, early in 1914, completed a railroad (777 miles) extending across German East Africa, from Dar-es-Salaam, on the Indian Ocean, to Tanganyika. The trip is made in two days. At the outbreak of the War of the Nations Belgium was constructing a line to run between the Upper Congo and the west shore of the lake.

**TANGERINE,** *tan'jer een,* a variety of orange named for Tangier, Morocco, where they were first found, and said to have been produced in America from the *mandarin* orange. The tangerine is somewhat flattened, and is of a deeper color than the common orange. The peel is easily separated from the pulp, which is sweet and juicy. Although they are smaller than the common orange, tangerines are highly prized by many on account of their flavor. They are raised in most of the states bordering on the Gulf of Mexico.

**TANGIER,** *tan jeer',* a picturesque old town of Morocco, of which it is the principal seaport. It is situated near the western entrance to the Strait of Gibraltar, about thirty-five miles southwest of the town of Gibraltar (see map, opposite page 81). From the sea the town has the appearance of a great amphitheater, with white houses rising tier on tier; at the highest point, on a plateau to the north, is an old castle, now a crumbling ruin. The tourist in Tangier is reminded of an ancient civilization at every turn of the narrow, winding streets, which are too steep to permit travel by vehicle. Littered with refuse and swarming with snake charmers, jugglers, venders, donkeys and camels, they present a panorama of typical Oriental life.

Besides the whitewashed houses of the native inhabitants, the place has synagogues, mosques, a Roman Catholic chapel, the sultan's palace, the residence of the French governor and several European shops and modern hotels. Electric lighting and telephones are modern innovations that have found a place here, and there is submarine cable and telegraph service to various points. Tangier and

a surrounding district (140 square miles in all) have been constituted an international district (see Morocco). Population, estimated to be from 35,000 to 46,000. There are about 6,000 Christians and as many Jews. The latter control most of the trade.

**TANNHÄUSER,** *tahn'hoi zer,* the hero of a German folk tale of the Middle Ages, a knight who was lured into the Venusberg, a hill in the Thuringian Forest, where Venus held her court. Under her spell, so runs the story, he remained given up to lustful pleasures till roused by the voice of the Virgin Mary. He then sought absolution from Pope Urban IV at Rome, but was told that the wand in the Pope's hand would sooner bud and bring forth leaves than that he should receive pardon; and so he returned, hopeless, to the Venusberg. After he had disappeared the Pope found that his wand had sprouted, but though he sought in all lands, the young knight could never be found.

This legend is the basis of Wagner's opera, *Tannhäuser.* In this version the knight, after he has escaped from the Venusberg, is saved from being put to death for singing unholy songs by the intercession of Elizabeth, who loves him. She herself dies of grief when he is refused absolution. Saved from reëntering the Venusberg by hearing Elizabeth's name, Tannhäuser returns, only to meet her funeral cortége. Thereupon he throws himself upon her bier and dies, but the blossoming of his pilgrim's staff indicates that he has received forgiveness.

The opera has many beautiful melodies, among the best known of which are the stately *Pilgrims' Chorus* and *Address to the Evening Star.* The latter, created for the leading tenor rôle, is one of the most exquisite songs ever composed. *Tannhäuser* was first produced at Dresden in 1845. It has always been one of the most popular in the Wagnerian series.

Consult Baring-Gould's *Curious Myths of the Middle Ages.*

**TANNIN,** *tan'in,* or **TANNIC ACID,** *tan'ik as'id,* a general name for several vegetable compounds, especially those from oak, hemlock, sumac and valonia, which are used in tanning hides. They occur naturally in tea and coffee and in galls on plants produced by the larvae of insects (see Galls). The tannin of commerce is an almost colorless, odorless powder, soluble in water, with a bitter, puckery taste. With iron salts it gives a blue-black coloration, the basis of many inks. It is a mordant in calico printing, and a medicine for eruptions, hemorrhage and diarrhoea.

**TANNING,** *tan'ing,* the process of making from the skins of animals the useful substance known as leather. The name is taken from that of the principal substance used in the process—tannin—a vegetable compound obtained from the bark of the oak, hemlock and other trees. Raw hides, soaked in tannin solutions, undergo a complete transformation, for the solution brings about certain chemical changes in the skins that render them soft and pliable. (For details of the process, see the article Leather.)

Chrome tanning is the name of a more recent process involving the use of chromium compounds. Its advantage lies in the fact that by this method but a few hours, instead of weeks or months, are required to convert the skin into leather. About two-thirds of the glazed kid used by American manufacturers is chrome tanned, but the operation is not successful in the case of sole leather. Chrome-tanned leather is extremely resistant to water, so much so that it cannot be dyed after it has once dried.

Consult references at the end of the article Leather.

**TANSY,** *tan'zi,* an herb of the composite family, whose leaves and flowers have a bitter taste and a powerful aromatic odor. At one time young tansy leaves were used by the housewife as a flavoring for omelets, pastry and other foods, but this custom is no longer common. Oil of tansy, yielded by the leaves, is poisonous, but is used in medicines to a limited extent. The plant grows commonly along roadsides, and is also cultivated in gardens. It bears dark green, featherlike leaves, and flat-topped, yellow flowers, which appear at the top of the stem. Tansy is a native of Europe, and was introduced into North America probably as a medicinal plant. Herb doctors formerly prescribed tansy tea for colds. The *yarrow* is sometimes wrongly called tansy.

**TAN'TALUS,** in mythology, a Grecian king who was said to be the son of Jupiter and the father of Pelops and Niobe. According to the legend he killed his son Pelops and served him as a dish to the gods, who in punishment condemned Tantalus to terrible sufferings in Hades. Plagued by an unquenchable thirst, he was made to stand immersed to the chin in water, which always receded when he tried to drink; and gnawed by never-ceasing hunger, he saw hanging above him fruit-laden branches which always swung away when he tried to reach them. From this legend the word *tantalize* is derived.

**TAOISM,** *tou'iz'm,* a philosophical system originated in China in the sixth century B. C. by a sage known as Lao-tse. He was a contemporary of Confucius, and these two great thinkers are known to have taken counsel together. At the present time the Chinese venerate the name of Lao-tse almost as much as that of Confucius, and Taoism holds an important place among the Chinese religions. It is, however, a debased and degenerate form of religion, with no suggestion of the lofty ideals of its founder. The priests of Taoism claim to have magic powers, and the ritual is a combination of witchcraft and demonology. The principles laid down by Lao-tse are difficult to explain, but he seems to have attempted to point out a way to right conduct and true happiness.

Consult Parker's *Studies in Chinese Rcligion;* Kennedy's *Religions and Philosophies of thc East.*

**TAPAJOS,** *tah pah zhosh',* one of the principal branches of the Amazon River, which rises in the southern part of Brazil, midway between its eastern and western boundaries, and flows in a northwesterly, then a northeasterly direction, discharging into the Amazon near Santarum, after a course of about 1,200 miles. Its basin lies between those of the Madeira and the Xingu. It is navigable by small vessels almost its entire length.

**TAPESTRY,** *tap'es tri,* an ornamental fabric used for decorating the walls of churches and palaces, and as a covering for windows, archways, furniture and floors. Tapestries are made by a special process of weaving, described as follows by an authority on the subject (Charles M. Froulke):

> Tapestries are made by interweaving variously colored woof threads with undyed warp threads after the warp threads have been stretched upon a loom either vertically or horizontally. This interweaving is done with an implement called a *broche* in French, which is neither a shuttle nor a bobbin, but partakes of the character of both, and for which there is no equivalent word in English. The picture represented is developed upon the warp by the different colors of the woof threads. Needles are never used in weaving tapestries. In the process of weaving the woof becomes practically an integral portion of the completed structure.

Tapestry making, which dates from antiquity, reached its artistic heights in the fifteenth century. The industry was then centered at Arras, in Flanders (now a city of France), and so excellent were the tapestries made there that the name of the city was applied to the fabric itself. In Shakespeare's *Hamlet,* to cite a familiar instance, Hamlet kills Polonius by driving his dagger through the *arras* behind which the eavesdropper is hidden. Antwerp, Brussels, Bruges, Lille and Valenciennes also developed as important centers of tapestry making, and the art became nationalized both in France and in Flanders.

In Paris, early in the seventeenth century, a factory under royal patronage was established in the dye works of the Gobelin family, and in 1662 the property was transferred to the control of the state. Gobelin tapestries became world famous, and the present museum connected with the establishment is one of two in the world in which tapestries and textile fabrics alone are exhibited. The other is in Florence. In the Gobelin museum may be seen tapestry reproductions of many of the great masterpieces of painting.

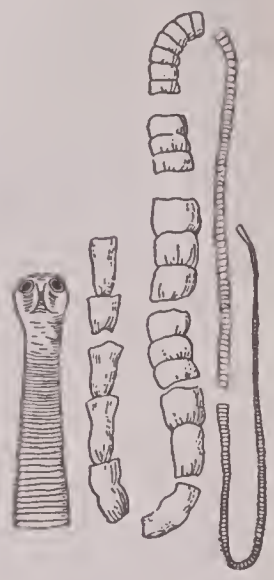
There are also valuable state collections of tapestries in Madrid and Vienna, and throughout the European continent; throughout the civilized world there are countless beautiful fabrics preserved in mansions, castles, cathedrals and museums. These tapestries picture historical events, scenes from legend and mythology, Biblical episodes and personages, flowers, conventional designs, heraldic devices, coats of arms, etc. Among the famous specimens of this art is a series illustrating scenes in the life of the Apostles, copied from cartoons made by Raphael, and now in the Vatican. The celebrated Bayeux Tapestry in Bayeux, Normandy, is really an example of embroidery. R.D.M.

Consult Hunter's *Tapestries: Thcir Origin, History and Renaissance;* Thomson's *History of Tapestry.*

**TAPE'WORM,** an animal parasite that lives in the intestines of human beings and seriously impairs the health. It consists of a very small head and many body and tail segments, and may vary in length from a few inches to five or six yards. The parasite grows by the formation of new segments, or buds, which develop behind the head and are continually pushed backward as others form. The tail segment is therefore the oldest. The head has a ring of four sucking disks, by means of which the animal attaches itself to the mucous membrane of the intestine. It obtains food by absorbing nourishment through its skin; the body floats freely and can take in nutriment from all sides. There are no digestive organs, and there is no mouth. Fertilization of eggs occurs in each division of the worm, and when the embryos reach a certain period of development some of the end sections separate from the others and

pass out of the victim's body. It is the appearance of these pieces of worm that proves the existence of the parasite in the intestine.

The symptoms of a person thus afflicted are an unusual appetite, loss of weight, pains in the abdomen, restlessness and lassitude. One troubled in this way should consult a physician and obtain a prescription for destroying the parasite. The head, a tiny, blackish object, must be secured, or the worm will grow again. Tapeworms enter the body through the eating of poorly-cooked pork or beef. C.B.B.



THE TAPEWORM
At the left is shown the head, considerably enlarged. The segments are parts of the worm.

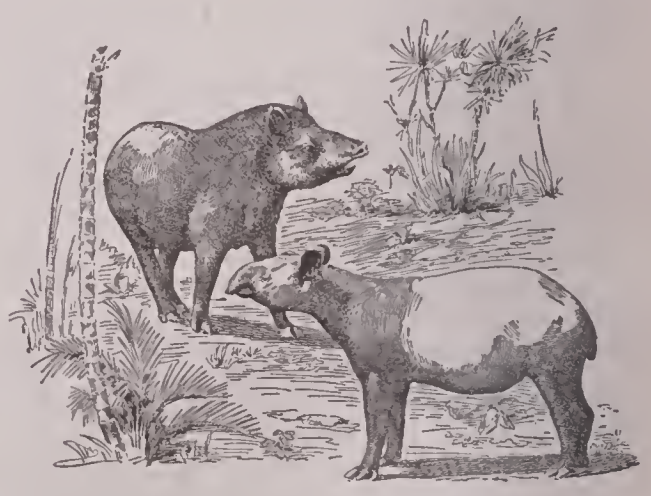
**TAPIOCA,** *tapio'ka,* a food starch obtained from the roots of cassava, a plant of the tropics, used chiefly in the preparation of a nutritious pudding. Cassava, which belongs to the same botanical family as the milkweed, is native to South America, but is cultivated in the West Indies, and in parts of Asia, Africa and the United States, its growth in the last-named country being confined to Florida and a narrow strip of land along the Gulf of Mexico from Florida to Texas. This interesting plant is not raised from the seed, but from the canes or stalks of the previous season, which are cultivated in much the same manner as sugar cane. The roots sprout from the joints, extending out on all sides in a huge cluster, in some cases attaining a length of three feet or more.

There are two general classes of cassava, the sweet and the bitter. It is from the latter that the tapioca of commerce is obtained. The roots are first washed, then cut, ground and reduced to a pulp, after which the mass is strained until all the starchy particles are separated from the fibers. The moist, starchy mass is then placed on hot iron plates, and in the process of drying the starch grains form the small, irregular, translucent balls known in the markets as pearl tapioca.

The pudding made from tapioca is a popular dessert, and is nutritious and easily digested. It is often served with sugar and cream or with a cream sauce. Apple or peach tapioca pudding, covered with a frosting made of white of egg and sugar, or served with cream sauce, is an attractive dish. Any cook book contains a number of suggestions as to ways of preparing this food for the table. Tapioca is rich in carbohydrates (starch and sugar), the proportion of these being eighty-eight per cent; water is present to the extent of 11.4 per cent, and there are small amounts of protein, fat, ash and fiber. The fuel value is 1,650 calories per pound (see CALORIE). Tapioca is also used in thickening soups. See CASSAVA.

**TAPIR,** *ta'per,* a group of forest animals consisting of five species, four of which are found in the western hemisphere. The chief characteristics of the tapirs are a clumsily-built body, short, stout legs, thick neck, and nose prolonged to form a movable trunk, or proboscis. They belong to the odd-toed animals; the front feet have four toes and the back ones, three. Thus they are allied to the horse and the rhinoceros. They are solitary, amiable creatures, that live in the depths of the forests, and frequent regions near water, in which they delight to plunge and bathe. They feed on shoots of trees, fruit and other vegetable food, which they draw into the mouth through the proboscis.

There are two species in South America, the most common of which inhabits the forest regions east of the Andes; the other dwells high up the slopes of these mountains. In Central America there are two species of hoglike tapirs, the smallest of the family. All of the American tapirs are of a uniform dark brown color when grown, but the young are marked with



TAPIRS
Above, a South American species; below, Malayan, or Asiatic.

fawn-colored stripes and spots. The Old World species is found in the Malayan region. It is larger than the American tapirs, and very curiously marked, as its back, rump and sides are white, and the rest of the body a glossy black,

the two colors standing out prominently. The young, however, are marked like the young of the American species. Tapirs are hunted by the natives for their flesh and hides.

**TAR.** When used without any qualifying word this term refers to *wood tar,* the product of the special distillation of several kinds of wood, including pine, fir and larch. *Coal tar,* a by-product obtained in the manufacture of illuminating gas from bituminous coal, is always referred to by that name. (For a full discussion of this product, see page 1448.)

Wood tar is a dark-colored, semifluid substance, having a strong, pungent odor. It is used for coating and preserving timber exposed to the weather, for calking seams in boats and sidewalks, and in the construction of roofs. Medicinally it is valued for its antiseptic qualities, and is used in the preparation of ointments and lotions for treating skin diseases. Tar is also an ingredient of various cough mixtures, especially that yielded by pine wood. There are two methods for producing tar—the method of stacking and slow firing, and that of distilling it in retorts or ovens. The latter is the more economical and up-to-date, and it makes possible the isolation of valuable by-products. Among these is wood pitch, which is employed in the manufacture of varnish and artificial asphalts.

The stacking method, though crude and wasteful, is still practiced in the rural districts of North and South Carolina, Georgia and Alabama. Long-leaf pine is extensively used in these localities. Sticks of green wood are heaped to form a conical stack, the whole is covered with damp earth and sand, and the wood is permitted to burn slowly for several days. As the tar is melted out of the wood it is collected in a large pan at the bottom of the stack, then conveyed through a pipe into a barrel.

**TARANTO,** *tah'rahn toh,* a fortified city and seaport in Southern Italy, situated on a rocky island lying between the Gulf of Taranto and the Little Sea, an inlet of the gulf (see map of Europe, following page 2092). For centuries Taranto has been famous for its oyster and mussel fisheries, which give employment to great numbers of inhabitants. An esplanade extends along the shore, but the town is poorly built, with narrow streets and small houses. The structures of note are a castle, a cathedral, the palace of the archbishop, a museum of antiquities and a nautical school. Taranto is an important maritime arsenal and torpedo-boat station, and repairs for the Italian Mediterranean squadron are made here. The place occupies the site of Tarentum, one of the leading cities of the ancient Greek world.

**TARANTULA,** *ta ran'tu la,* a large spider named for Taranto, a city of Southern Italy, where it was first closely observed and where it is still found in great numbers. Formerly its sting was supposed to cause *tarantism,* a peculiar dancing disease. The name, first applied in Europe, is now commonly given to any of the large, hairy spiders abundant in the Southwestern United States and in Central America, from which they are occasionally transported to temperate climes in barrels of fruit. Tarantulas catch their prey, not in a web, as do many spiders, but by swiftly pursuing and attacking it. Their homes are little wells in the ground, lined and covered with silky webs. Although their bite is painful, it is no more dangerous than that of other spiders, and, so far as known, is never fatal.

TARANTULA
About one-half actual size.

**TAR'BELL,** Ida Minerva (1857- ), an American writer famed for her sociological and historical investigations, was born in Erie County, Pa. She was graduated from Allegheny College, and from 1883 to 1891 served as associate editor of *The Chautauquan.* After studying for three years at the Sorbonne and the Collège de France, in Paris, she became, in 1894, associate editor of *McClure's Magazine,* a position which she held until 1906. In that year she accepted a similar position with the *American Magazine.* Besides a *Life of Abraham Lincoln, Life of Madame Roland, Short Life of Napoleon Bonaparte* and *The Tariff in Our Times* she wrote other biographical and historical sketches, numerous articles for magazines, and the book for which she is best known, the *History of the Standard Oil Company.* This last-named work, by opening the eyes of the people to the power and the methods of great corporations, had a very real effect on business in the United States. Another volume which marks her as a keen observer is *The Business of Being a Woman.*

**TARE,** *tair,* a low climbing plant which is also known as *vetch.* It has compound leaves,

containing from four to seven pairs of leaflets, and bears purple flowers resembling the pea blossom. In Europe, because it flourishes in poor soil, it is grown extensively for green fodder, and is used also for hay and as a fertilizer. There are two varieties, the *summer* and the *winter* tare, besides the *wild* tare. The plant mentioned in the parable of the tares and wheat, found in *Matthew* XIII, 24-30, was probably a species of grass called *darnel.*

**TAR'GET,** a mark at which to shoot. The name is derived from *targo* or target, a small, round shield carried on the left arm and used by Highlanders of Scotland until the seventeenth century. Targets to be shot at with arrows, as in archery, are usually made of a canvas-covered frame filled with straw, with rings surrounding the center, or *bull's-eye.* The targets for rifle shooting are usually square, white, with a black bull's-eye, and two rings invisible to the person shooting. If the bullet hits the bull's-eye, five points are credited to the marksman; the inner circle counts three, and the outer circle one, point. This kind of target for military practice is now practically obsolete, except for elementary lessons in shooting. Advanced practice targets consist of silhouettes of men painted on canvas in natural colors, head and shoulders, men lying down, mechanical running men and disappearing targets, which bring the shooting practice as near as possible to actual war conditions.

Valcartier Camp, Quebec, is equipped with what is considered the finest and most varied shooting ranges in the world for military purposes.

There are to be found in nearly every town in the United States shooting galleries where marksmen may test their skill on payment of a small sum, by shooting at a wide variety of moving and stationary targets.

An illustration of the standard target used in archery is shown in the article ARCHERY.

**TARGUM,** *tahr'gum,* a paraphrase of the Old Testament, in Aramaic, the language used by the Jews after the Exile, made for use in the synagogue worship. At first the Targums were merely spoken explanations of the Hebrew text, but they gradually took on a fixed form and were reduced to writing. When the law was read, the paraphrase was given after it, verse by verse, but in case of the Prophets three verses might be read and then the Targum. There are three targums extant on the Pentateuch, one on the Prophets, and targums on *Psalms, Job, Proverbs, Song of Songs, Ruth, Lamentations, Esther, Ecclesiastes* and *Chronicles.* See ARAMAIC.

**TARIFF,** *tair'if,* a list or schedule of duties levied on goods sent to or arriving from foreign lands. In its original meaning a tariff was not a tax or duty, but rather a list of articles on which duties were levied. However, for many years in law the word has meant both the list and the rate, or duty. The word is derived from the Spanish *tarifa* and the French *tariffe,* which mean a price list or rate book.

Tariffs are levied for three purposes: (1) as a means of obtaining revenue for a country; (2) as a means of keeping out certain foreign articles while a nation is developing its own manufactories for such goods; (3) and as a means of punishing or retaliating upon other nations for creating high rates. This last form is seldom employed now, but its opposite, *reciprocity,* whereby one nation lowers its duties for another if the latter returns the favor, is very common. A country which has a tariff for revenue only, without attempting to secure protection for its industries, is known as a free-trade nation. The only important nation which maintained practically free trade

up to the time of the War of the Nations (1914) was Great Britain Free trade does not mean freedom from all tariff restrictions; Great Britain levies a revenue duty on tea, sugar, coffee, wines and a few other articles which could not possibly be raised at home.

**Early Tariffs.** The custom of collecting such revenue is very ancient. The early Egyptians and Babylonians levied import duties at their ports and city gates, while the government of Athens laid a duty of two per cent on both incoming and outgoing merchandise. Moreover, a duty or tax was collected by the Athenians for the use of their harbor by foreign vessels. The Roman government, about the time of Christ, was demanding five per cent of the value of goods as a regular import duty, and under the later emperors this was increased to twelve and one-half per cent. Between the years 800 and 1500 the tariff conditions in Europe were perplexing. Every petty feudal lord claimed the power to collect a revenue on goods passing through his lands, and oftentimes a merchant going from one city to another was obliged to pay such a fee every ten or fifteen miles. Merchandise going overland from Rome to Germany or Holland sometimes paid in tolls many times its original price.

**England.** It is certain that duties were collected at the London ports as early as 980, and by 1380 these were so important that Chaucer, the first great English poet, considered himself honored when appointed to the post of supervisor of London customs. Under Edward I, who ruled from 1272 to 1307, special duties were levied on goods brought by foreign merchants, thus establishing the first tariff for protection in England. Such duties were called *poundage,* because they were based on weight. In the seventeenth century the ruler acquired the further right of taking two tuns or barrels of wine from every twenty imported; this tax was called *tunnage*. All these taxes on imports were considered temporary and were frequently increased, decreased or dropped; but toward the close of the seventeenth century duties were made permanent, and were levied expressly for the purpose of paying the government debt.

Gradually it had become the custom to adjust the duty to the value and not the bulk or weight of an article, and from time to time, between 1545 and 1800, rate books were issued by the government to show exactly what articles were thus taxed. The suffering of the British people, especially the Irish, because of a series of famines after 1840, caused Parliament to see that the islands could not produce enough cheap food for the inhabitants. The first great step towards free trade was the repeal of the Corn Laws in 1846, followed by the abolition or reduction of more than a thousand duties. Great Britain became, therefore, a free-trade country. The British colonies failed to follow the mother country in advocating free trade; Australia, South Africa and Canada have insisted upon protective rates for numerous commodities. India is the only important British colony which has free trade.

**Other Countries.** Countries not so peculiarly situated have not been inclined to adopt free trade. In France, for instance, high tariff was the rule until 1790, not only at the entrance ports but between each little province within the country. The internal tariff was abolished during that year, but with the exception granted by a few reciprocity treaties France still demands a protective tariff on foreign goods. Germany had only moderate protective rates until 1902, when the duties on numerous agricultural and manufactured articles became almost prohibitive. Other European nations have followed the examples of France and Germany, and few civilized countries are now without high duties.

**United States.** From the earliest days of the American nation, peculiar circumstances seemed to compel the adoption of protective rates. The bitterness between Great Britain and the new country had caused both Englishmen and Americans to desire each other's goods kept out, and it was looked upon as an act of patriotism in an American to discourage the importation of foreign merchandise. The immense debts of the Revolution and the War of 1812 made necessary the gathering of every available penny of revenue, while the feeble and easily-frightened industries of the new land needed every possible aid. In time, when these infant industries became strong, their very strength was an argument for the continuance of the policy that built them up.

The first national tariff law in the United States was that of 1789. Although the law states that one of its objects is the "encouragement and protection of manufacturers," the duties levied by it were so moderate that the protection granted was slight. This act was superseded by the tariff of 1816, a distinctly protective measure. The duties were not high —the highest rate was twenty per cent—but they were in several cases sufficient to demonstrate the possibilities of protection to home

industry. In the next year the internal revenue tax, which had prevailed since the War of 1812, was abolished, and President Monroe in a message to Congress frankly recommended a tariff solely for protection. Efforts were made in Congress to secure such a law, but no important tariff act passed both Houses until 1824. This law, which raised the average duty to thirty-seven per cent, was based on the principle that such foreign-made goods as competed with domestic products should be excluded from the American market.

The tariff was rapidly becoming the most important political question. The loose constructionists, under the leadership of Henry Clay, were the expounders of the "American system," which included a high protective tariff. The Tariff of 1828, generally called the "tariff of abomination," laid almost prohibitive duties on woolen and cotton goods and a few other commodities. This act aroused great opposition in the South, which then exported each year about $25,000,000 worth of tobacco, cotton and rice to Great Britain, whereas the imports of manufactured goods from Great Britain amounted to $15,000,000. The South feared that prohibitive duties would lead to retaliation by Great Britain and thus kill its export trade in raw materials. The South also declared that the Constitution gave Congress power to levy duties for revenue only and not for protection. The protests against this act culminated in the nullification movement, led by John C. Calhoun. Congress modified the duties slightly in 1832, but still recognized the principle of protection.

As the tariff of 1832 was still unsatisfactory to the South, in 1833 a compromise was effected whereby the duties would be gradually reduced until 1842, after which year there was to be a uniform duty of twenty per cent on all imports. In 1842, however, the Whigs passed a new law providing high duties. When the Democrats were returned to power in 1845 they promptly passed a new bill, the Walker Act, which was called a free-trade measure; it lowered some duties, but, in fact, it retained many of those which had been the subject of controversy in the preceding half century. In 1857 the duties were lowered again, this time without much opposition, because there was a growing surplus in the national treasury.

The policy of decreasing the duties was abandoned at the outbreak of the War of Secession. The sentiment against protection had gradually increased after 1828, and except for the period of 1842 to 1846 the duties had been slowly lowered. Under the stimulus of war, Congress passed the Morrill Act of 1861, raising the average duty from twenty to twenty-seven per cent. During the next four years not a session of Congress passed without some increases in duties. After the war, except for one law in 1867, the tariff question was lost for fifteen years in a mass of other legislation which seemed more important. In general, the operation of these protective tariffs coincided with an astonishing growth in manufactures. There was a feeling throughout the country that protection was necessary and beneficial.

About 1880, however, the government's annual surplus began to increase, and Congress spent it wastefully. The demand for a real remedy, a lower tariff, led to the appointment of a Tariff Commission in 1882 to ascertain the effect of the existing tariff laws and to recommend changes in them. As the commission and Congress were both controlled by high protectionists, the resulting law of 1883 lowered but few schedules; it was designed to give only such reductions as would silence the demands of the opposition. The tariff became one of the issues of the campaign of 1884, which resulted in the defeat of the Republicans and the election of Grover Cleveland, the first Democratic President since the War of Secession.

The Mills Bill of 1888, embodying the low-tariff ideas of President Cleveland and his party, was passed by the House, but failed to pass in the Senate, which the Republicans controlled. The Republicans, in their turn, interpreted the outcome of the campaign of 1888, which returned Harrison, a Republican President, as an endorsement of high tariff. The result was the McKinley Tariff Act of 1890, which raised the average level of duties to a higher point than ever before. A noteworthy feature of the act was the reciprocity clause, added through the influence of James G. Blaine, then Secretary of State. A month after this act was passed the Democrats secured control of the House as the result of the November elections. In the ensuing Presidential campaign the tariff was again the issue, and Cleveland's second election seemed to make a lower tariff inevitable. Then the severe panic and crisis of 1893, followed by depression in all lines of business, made caution and compromise necessary. The Wilson Bill of 1894 made so few reductions that Cleveland showed his disapproval by allowing it to become a law without his approval. (See CLEVELAND, GROVER.)

The financial and economic crisis of 1894 to 1896 foreshadowed another change in the tariff. Although the campaign of 1896 was fought solely on the question of free silver, President McKinley called a special session of Congress to consider the tariff. In the resulting Dingley Tariff Act of 1897, protective duties reached their maximum, especially those on wool, silks, linens and hides. During the Spanish-American War a number of special duties, particularly one of ten cents a pound on tea, were levied for revenue purposes, but these were repealed in 1901 and 1902.

The industrial development of the United States since 1890 has been little short of marvelous. The Republicans, almost without exception, have attributed this growth to the protective tariff. The Democrats, with equal unanimity, have attributed it to the country's enormous natural resources, and have pointed to certain evils connected with industrial control which they claimed were caused by the tariff laws. The need of some readjustment of duties became clear about 1904, and after that date both the great political parties declared themselves in favor of tariff revision. The Republicans, however, paid no attention to the tariff during Roosevelt's administration, and when they did consider it, in the first year of Taft's administration, passed the Payne-Aldrich law. There is still some dispute as to whether this act raised or lowered the level of the duties as levied under the Dingley tariffs. The changes were so numerous and so complex that nobody was quite sure what the effects of the law would be. The President defended the law as the best possible under the circumstances, but the public expressed its disapproval by returning a Democratic majority in the House of Representatives a year later.

In 1913, immediately after his inauguration, President Wilson called a special session of Congress to enact a new tariff law. The new bill, known as the Simmons-Underwood Tariff Act, provided many changes in the rates. The duties on cotton and woolen goods were greatly lowered, and raw wool was placed on the free list. Sugar, until May 1, 1916, paid a slight duty; thereafter it was entered free. Other articles on the free list are many chemicals and metals, lumber, coal, boots and shoes, cement, asphalt, wood pulp, and original works of art. About 300 rates remained unchanged, over 900 were reduced, and eighty-six were raised. Of the eighty-six increases, over half were in the chemical schedule, the remainder being on gold and silverware, precious stones, perfumes and other luxuries. To compensate for the loss in revenue which the reductions would cause, the act provided an income tax.

One of the greatest difficulties to be faced in the preparation of a tariff for the United States is the extent of the country's area and the variety of its industries. Thus the clothing manufacturers of the East and middle West want free wool, but the sheep rancher in the far West demands protection. The sugar planter in the South needs a bounty or an import duty to enable him to compete with the planters in Cuba and the tropical regions, but the sugar refiner and many other people ask for free sugar. Thus a general tariff act always involves compromise, lest the interests of one section or one class be sacrificed to those of another. Occasionally the interests of one section must yield for the good of the whole. W.F.Z.

Consult Dewey's *Financial History of the United States,* in those chapters relating to the tariff; Taussig's *Tariff History of the United States.*

**Related Subjects.** The following articles in these volumes will give further information on the subject of the tariff, and will make clear certain references in the above discussion:

Democratic Party
Free Trade
Nullification
Political Parties, subtitle *Political Parties in the United States*
Protection
Reciprocity
Republican Party
Tax and Taxes

**TARKINGTON,** *tahr'king tun,* Newton Booth (1869- ), an American novelist, born in Indianapolis, Ind. He was graduated from Princeton University in 1893, and turned his attention at once to literature. *The Gentleman from Indiana,* published in 1899, made him well known throughout the United States, and his reputation was increased by the appearance of *Monsieur Beaucaire,* a charming and artistic story of France. This last-named book has been dramatized, and was played with much success by Richard Mansfield. Tarkington's next novels, among which are *The Two Vanrevels, Cherry* and *The Conquest of Canaan,* were not so popular, but his

BOOTH TARKINGTON

comedy, *The Man from Home,* which proved a very successful stage production, greatly increased his popularity. Other later works were *Cameo Kirby, Springtime, Your Humble Servant, Penrod* and *Getting a Polish.*

**TARPEIAN,** *tahr pe'yan,* **ROCK,** a steep rock forming part of the Capitoline Hill at Rome. According to tradition it was named for Tarpeia, the daughter of the governor of the Roman citadel in the time of Romulus.

THE TARPEIAN ROCK
As it appears in the twentieth century.

Desiring greatly the golden bracelets worn by the Sabine enemies of Rome, Tarpeia treacherously opened to them the gate of the fortress, having first gained from the Sabines a promise that they would give her what they wore on their left arms. Once within the citadel they cast their shields upon her and crushed her to death. She was buried at the foot of the rock, which ever afterward bore her name. In later periods of Roman history those convicted of treason were ordinarily killed by being thrown from the Tarpeian Rock.

**TARPON,** *tahr'pon,* a large game fish shaped somewhat like a salmon, found in West Indian waters and off the southern Atlantic coast of the United States. It grows to the length of nearly six feet and frequently weighs 100 pounds. The flesh is coarse and not desirable for food, but the large, tough, silvery scales are used in decorative designs. Tarpon fishing is one of the best American sports, for the fish is a skilful fighter and very strong.

**TARQUINIUS,** *tahr kwin'i us,* LUCIUS, surnamed PRISCUS, the fifth legendary king of Rome, who reigned from 616 to 578 B.C. He was not of royal blood, but succeeded in gaining the throne on the death of Ancus Marcius, to whose sons he had been appointed guardian. His reign was one of the periods to which later Rome looked back longingly in times of trouble or depression. He waged successful war against the Sabines and the Latin cities, made vassals of the powerful Etruscan cities (see ETRURIA), and began many great public works, among which were the *cloacae,* or sewers, the Circus Maximus, and the Temple of Jupiter, on the Capitoline Hill. It was he, according to some legends, who acquired the Sibylline books, though other traditions connect these famous documents with Tarquinius Superbus. He was assassinated by the sons of Ancus Marcius.

**TARQUINIUS,** LUCIUS, surnamed SUPERBUS THE PROUD, the last of the legendary kings of Rome, whose reign was from 534 to 510 B.C. He was the son of Tarquinius Priscus and the son-in-law of Servius Tullius, whom he had put to death to secure his own accession. He at once annulled all of the reforms of his predecessor, depriving the lower classes of their rights and catering to the patrician class. His tyranny won for him general hatred, and the crime of his son, Sextus Tarquinius, against Lucretia precipitated a rising which drove Tarquinius from the throne and resulted in the founding of the Roman republic. Several unsuccessful attempts were made to replace Tarquinius on the throne, the most famous of which was that of Lars Porsena, celebrated by Macaulay in his *Horatius at the Bridge.*

**TARSUS,** *tahr'sus,* the most important town in ancient Cilicia, in Asia Minor, and the birthplace of the Apostle Paul. He spoke of it as "no mean city." Located in a fertile plain on the banks of the River Cydnus, twelve miles from the sea, Tarsus was a center of commerce from very early times. In the days of Paul it was one of the "free cities" of the Roman Empire and was renowned as a center of education and culture. Modern Tarsus, though it has a population of 25,000, is a backward and unattractive Turkish town, with no features of interest other than a few ruins of the Roman era.

**TARTAN,** *tahr'tan,* from the French *tiretaine* and the Spanish *tiritaña,* meaning a *thin woolen or silken cloth,* is the name of a worsted cloth checkered or crossbarred with threads of different colors. Tartan is historically associated with the costumes of the Highlanders of Scotland, and according to tradition each of the numerous clans had its own distinguishing tartan or plaid. Thus there was the tartan of Campbell of Argyll, light green crossed with dark green, with narrow, independent crosslines of white; the Macdonald of

Glengarry and Keppoch, red, with open, broad blue crosslines, and two independent blue crossings; the Macpherson, pale gray, four darker gray bars at crossings, the whole covered with red, double independent lines; and so on. The effect of a large number of these tartan costumes is suggested by Scott, in the *Lady of the Lake:*

> Scarce to be known by curious eye
> From the deep heather where they lie,
> So well was match'd the tartan screen
> With heath-bell dark and brackens green.

Tartan is not at the present time restricted to Scotland, but is worn generally in various countries. Numerous patterns are put out by manufacturers, and woolen, silk and mixed goods are used as materials.

Interesting information concerning the tartans of the Scottish clans may be found in Skene's *The Highlanders of Scotland.*

**TARTAR,** *tahr'tahr,* or **ARGOL,** *ahr'gol,* a substance deposited as a hard crust on the sides of casks during the fermentation of grape juice. Chemically it is known as impure acid potassium tartrate. Tartar varies in color from brownish-white to dark red, according to the color of the wine. It is important commercially as the source of cream of tartar (see CREAM OF TARTAR, for methods of preparation). The tartar that is formed on the teeth is a hard mixture of phosphate and lime deposited from the saliva. See TEETH.

**TARTAR EMETIC,** *e met'ik,* a medicinal preparation used in small doses as an emetic or to reduce fever and cause sweating. In large doses it is a violent, irritant poison. Tartar emetic acts on the stomach and intestines and exerts a depressing effect on the heart and nervous system, and is now only sparingly used. It should never be taken unless prescribed by a competent physician. It is prepared by making a paste of water, antimony oxide and acid potassium tartrate, boiling the mixture with water and letting the solution crystallize.

**TARTARIC ACID,** *tahr tahr'ik as'id,* a vegetable acid occurring as the potassium salt in many plants and unripe fruits, but especially in grapes. It is obtained by treating the tartar deposited in wine casks (see TARTAR) with lime and sulphuric acid. It forms large, clear crystals easily dissolved in water, the solution effervescing and having a refreshing, sour taste. It is used in the manufacture of dyestuffs and baking powders, in dyeing and calico printing, in photography and as one ingredient of Seidlitz powders (which see).

**TARTARS,** or **TATARS,** *tah'tarz,* originally the name of the Mongolic races of Central Asia, but later extended to all the tribes ruled by Genghis Khan (which see) and his successors. *Tatar* is a Tungusic or Manchu word, meaning *archer* or *nomad,* and first occurred in the Chinese records of the ninth century in reference to certain Mongol tribes which were driven by the Khitans southward. The Mongols and Tatars were organized into one nation by Genghis Khan, whose father was a Mongol and whose mother was a Tatar. At the present time the Tatars are represented by the Fish-shin Tatars of Northern Manchuria, the Solons and Daurians of Northeastern Mongolia and the Manchus of China.

Tatar took the form *Tartar* at an early date by association of the word with Tartarus, or Hades, of classic mythology. The tribes bearing the name were greatly feared because of the atrocities they committed. The word *Tartar,* however, is not correct from the standpoint of etymology.

**TARTARUS,** *tahr'tahr us,* in early Greek mythology, a dark abyss surrounded by the fiery river, Phlegethon, where Jupiter imprisoned the rebelling Titans. Tartarus was later considered the place of punishment for all spirits of the wicked, and the name was used interchangeably with Hades. Aeneas, in his adventures in the abode of shades, comes to a point where the road divides, the right branch leading to Elysium and the left to Tartarus. In Vergil's *Aeneid* occur these lines:

> There rolls swift Phlegethon, with thund'ring sound,
> His broken rocks, and whirls his surges round.
> On mighty columns rais'd sublime are hung
> The massy gates, impenetrably strong.

**TARTARY,** *tahr'tahr i,* a name applied in the Middle Ages to that part of Asia including Manchuria, Mongolia, Turkestan and the southern part of Asiatic Russia. The Tartars were fierce and warlike, and had the reputation of being very cruel in war. The modern expression, "to catch a Tartar," means to find a resourceful opponent in one considered easy to overcome, either in combat or in a test of mental powers. There is also an expression, "Scratch a Russian and you find a Tartar," meaning that beneath the veneer of Russian civilization lies the ferocity of a Tartar. That charge can be advanced against only a small minority of the people.

**TASCHEREAU,** *tash ro',* ELZÉAR ALEXANDRE (1820-1898), a Roman Catholic prelate, the

first Canadian to wear a cardinal's hat. Cardinal Taschereau was born at Sainte Marie de la Beauce, Que. He was educated at Quebec Seminary, with which he was then connected for nearly three decades, first as professor of moral philosophy and after 1860 as Superior. After 1860 he was also rector of Laval University. In 1862 Taschereau was made vicar-general of the diocese, and in 1871 archbishop. In the next year he founded the Hotel Dieu du Sacré-Coeur, a convent and hospital. In 1886 Pope Leo XIII elevated him to the rank of cardinal. He retired from the active administration of the diocese in 1894.

**Sir Henri Elzéar Taschereau** (1836-1909), younger brother of the cardinal, was a distinguished Canadian jurist. He was called to the bar in 1857, and established practice at Quebec. From 1861 to 1867 he sat as a Conservative in the Canadian assembly, and in 1871 became a judge of the superior court of Quebec. From 1878 to 1902 he was a puisne judge of the Supreme Court of Canada, and from 1902 to 1906 was Chief Justice. Knighthood was conferred on him in 1902. Sir Henri wrote *Notes and Commentaries on the Criminal Law of Canada; The Code of Civil Procedure in Lower Canada,* and *The Criminal Code of the Dominion of Canada.*

**TASHKEND'**, or **TASHKENT'**, the largest city in Asiatic Russia and the capital of Russian Turkestan, is situated in the valley of the Chirchik River, fifty miles above the union of that stream with the Syr-Darya. The city is divided into two quarters, the old Asiatic and the new Russian. The latter is regularly built and contains academies, public libraries, a museum and theaters; in the old quarter are numerous mosques, and inns for the accommodation of caravans. Tashkend is an important center for the shipment of merchandise to Bokhara, Persia, Kashmir and India, and it has railroad connection with Krasnovodsk, 1,085 miles distant on the Caspian Sea, and with Orenburg, in Eastern Russia. Population (Asiatic and European nationalities), 1912, 271,650.

**TASMANIA,** *taz ma'ni a,* formerly called Van Diemen's Land, an island forming one of the six states of the Commonwealth of Australia, separated from the southeastern part of the mainland by Bass Strait, 140 miles wide. The island is of triangular shape, 200 miles from north to south and 245 miles from east to west, covering an area of 26,215 square miles, or about as large as Virginia and Delaware combined. The population was 201,675 in 1911. The coast is remarkable for its bold headlands and picturesque inlets. The interior of the island forms a plateau with an elevation of between 3,000 and 5,000 feet above the sea level; this plateau contains many lakes, the principal being Lake Austrua, Lake Saint Clair, Lake Sorell, Lake Echo, Great Lake and Arthur's Lake. The mountain ranges bordering the central plateau do not reach a very great altitude, the highest point being Mount Cradle, which is elevated 5,070 feet above sea level.

LOCATION MAP
The island lies south of Victoria, a sister state of the Commonwealth.

The geological formation of Tasmania is intimately connected with that of Victoria, on the main Australian continent, to which it was joined until after the Miocene period. The island is well watered, possessing rivers which flow into the sea on the north, south, east and west. The soil is very fertile, and agriculture forms one of the chief occupations of the inhabitants.

The animal life of Tasmania is similar to that of Australia, except that the dingo, or wild dog of Australia, is not present. Tasmania has two carnivorous animals, the tiger and devil, or wolf, which are peculiar to that country. The kangaroo, opossum, kangaroo rat, wombat, the duck-billed platypus and the ant-eater are also common.

The climate is really delightful and more healthful than that of any other of the Australian states. The heat is not usually excessive, though during exceptionally hot periods the thermometer has been known to rise as high as 110° F., and it seldom drops below 47° F.

The principal wealth of the state consists of its copper mines. Gold, silver, tin and coal are also produced, the combined value of the mine production exceeding that of agriculture.

Tasmania sends six senators and five representatives to the Federal Parliament of Australia. Every person living in Tasmania for a period of twelve months who is over twenty-one years of age is entitled to vote. The franchise has been conferred on women. Elementary education is not absolutely free, a small fee being charged, but this is waived in cases of genuine poverty, which are rare.

The total mileage of the railroad systems in Tasmania amounts to about 620 miles, mostly owned by the state. Macadamized roads, kept in good repair, run throughout the island. The chief towns are Hobart, with 40,000, and Launceston, with 22,500, inhabitants. The government of Tasmania is similar to that of the other Australian states. There is a governor appointed by the Crown, a legislative council of eighteen members, chosen for six years, and a house of assembly, whose members are chosen for three years.

*Van Diemen's Land,* as Tasmania was first named, was discovered by Tasman, the Dutch navigator, in 1642, and named after his patron Van Diemen, governor of the Dutch East Indies. It was first settled in 1802 when a party of twenty-five convicts with several officials from New South Wales landed on the south coast. Little is known of the aborigines of Tasmania; they are extinct, but are supposed to have been of Australian origin. F.ST.A.

Consult Murray's *Tasmanian Rivers, Lakes and Flowers;* Smith's *A Naturalist in Tasmania.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Australia | Miocene Period |
| Hobart | Tasmanian Wolf |

**TASMANIAN WOLF,** *taz ma'ni an wulf,* THE, also called ZEBRA WOLF, THYCALINE and POUCHED DOG, is a pouched animal (see MARSUPIALS) which resembles a wolf or wild dog in appearance. It is a native of Tasmania, an island belonging to the Australian Commonwealth. The Tasmanian wolf is usually about forty inches long, but sometimes attains a greater size. The short fur is grayish-brown, and there are black stripes across the back much like those of a zebra. The nose is long and sharp, and the tail is tapering. These animals were common in Tasmania in early days, but the European settlers succeeded in driving them into the mountains, after great depredations had been committed in sheepfolds and poultry yards. They are nocturnal in their habits, hiding in deep burrows or gulches in the daytime, from which they make nightly raids for food.

**TASSO,** *tas'o,* TORQUATO (1544-1595), one of the greatest of the Italian poets, was born at Sorrento. His father, a fifteenth century poet, took him to Rome at the age of ten and there gave him careful training in literature and history. At that time he showed evidence of a remarkable memory and could recite long portions from the works of Greek and Latin poets. He was sent at the age of sixteen to the University of Padua, Italy, to study law, but within a year produced a romantic poem in twelve cantos, entitled *Rinaldo.* This remarkable work, dealing with the legends of Charlemagne, surprised and gratified the Italian reading public but enraged the father, who wished the boy to confine his energy to the law. However, public admiration was so great that the young poet was at length permitted by his father to devote his time to literary study, and on invitation of the authorities at the University of Bologna went to that institution. In 1562 he had to leave the school because unjustly accused of writing certain bitter satires against the professors. He then returned to the University of Padua, where his admiration for Vergil's poetry became so intense that he determined to write an epic along the lines of the *Iliad.*

TASSO

At this time the Turks were harassing the Hungarians and the Italians, and the popular talk of another crusade against those invaders suggested to him the idea of basing the epic upon the adventures of Godfrey de Bouillon in a crusade to Jerusalem. Thus began the famous poem, *Jerusalem Delivered,* which, after Dante's *Divine Comedy,* is given rank as one of the greatest epics in the Italian language. While he was engaged in planning and writing portions of this long poem, he found a patron in Cardinal d'Este, who took him to one of the centers of Italian culture, the court of Ferrara. There, amidst magnificent surroundings, noted men, beautiful women and his own love affairs, he gained a multitude of experiences which he afterwards wrote into his epic. A quarrel with his patron sent him forth penniless in 1571, but Duke Alfonso of Ferrara sheltered him, and under the patronage of this nobleman he produced in 1573 *Aminta,* possibly the most beautiful of all Italian pastoral plays.

In April, 1575, he announced that his *Jerusalem Delivered* was finished, but before publishing it desired its examination by a body of churchmen lest the charge of heresy or infidelity be brought against him. The churchmen

demanded that all mythology and chivalrous adventures be omitted, and persecuted him with their criticisms. A blow on the head during a quarrel added to his mental discomfort, and in 1576 he showed signs of insanity. He had an idea that he was constantly being watched, and in June, 1577, while in the home of the Duchess of Urbino, drew a knife on a servant whom he considered a spy. He was taken to a country home, but escaped and wandered from town to town. In February, 1579, he returned to the court of Ferrara, and burst into the royal rooms with such signs of rage that he was confined as a madman. At length he was allowed to go to Naples, where he composed his *Jerusalem Conquered,* really a revision of the other epic with most of the chivalry omitted.

In 1593 he was ordered to Rome by Pope Clement VIII to be crowned for his poetry, but in the midst of the preparations he became ill and died in the Convent of Santo Onofrio, near the city. The pathetic story of his life has been used by such poets and writers as Goethe, Lamartine and Byron as a theme for poems and stories. The *Rinaldo,* the *Aminta,* a tragedy entitled *Torrismondo,* and *Jerusalem Delivered* are among the greatest of Italian writings, while the last-mentioned poem is classed as one of the world's noblest epics. R.D.M.

Consult Boulting's *Tasso and His Times;* Woodberry's *Inspiration of Poetry.*

**TASTE,** *tayst,* one of the five special senses —the one through which we recognize certain substances when they are dissolved in the mouth. The sense of taste is located in the mucous membrane on the upper side of the tongue and the upper back part of the mouth. On this membrane are numerous minute elevations called *taste buds,* containing the endings of the nerve filaments which convey the impulse to the taste centers in the brain. When the sensation is registered by the brain centers it is identified as *sweet, sour, bitter* or *salty.* All taste sensations are formed by combinations of these or by combination of one of them with the sense of smell. These two special senses are very closely related, and it often happens that smell sensations are mistaken for those of taste. Also, when the sense of smell is deadened by a cold in the head, the victim usually complains that he cannot taste well, or that all foods taste alike. The "mouth watering" that occurs when an appetizing odor greets the nostrils is another example of a delicate relationship existing between smell and taste. In this case there is stimulation of the salivary glands, brought about by anticipation of the enjoyment of eating.

The sense of taste is one that can be trained. In the grocery trade, for instance, the buyers use this sense in appraising the quality of coffee, tea, butter and other commodities. It is also a sense that will become tired if not used with discretion, and since it adds greatly to one's ability to enjoy life, it should not be abused. People who indulge to an excessive degree in candies, highly-seasoned foods and the like impair their power to enjoy them. The ideal way is to eat plain food, as a rule, and delicacies but occasionally. If such a method is followed the sense of taste will not become vitiated. C.B.B.

**Related Subjects.** In connection with this discussion of taste, the reader may consult the following articles in these volumes:

| | |
|---|---|
| Mouth | Smell |
| Senses, Special | Tongue |

**TATTOO'ING,** the savage art of making permanent scars in patterns on the skin. It originated as a purely decorative custom, but among some races it grew to have a religious or tribal significance. Real tattooing can be

TATTOOING
As performed in Burma

practiced successfully only by light-skinned people, for it includes rubbing colors into the fresh scars. Needles of steel, bone or shell are used to puncture the designs in groups of lines and dots, and one or several colors are employed to permanently set the patterns. The Polynesians confine themselves to black, which turns to blue in the skin, but the Japanese use three or four pigments. Dark-skinned races practice a related art, *scarification,* or gashing the skin and rubbing in ashes or clay, which causes light, raised scars to form. Another method is to insert splinters of wood in the skin and set them afire, known as *branding.*

As civilization spreads, tattooing dies out, though sailors of the most enlightened countries often have designs made on the forearm. In Europe the practice is confined chiefly to the criminal classes in large cities.

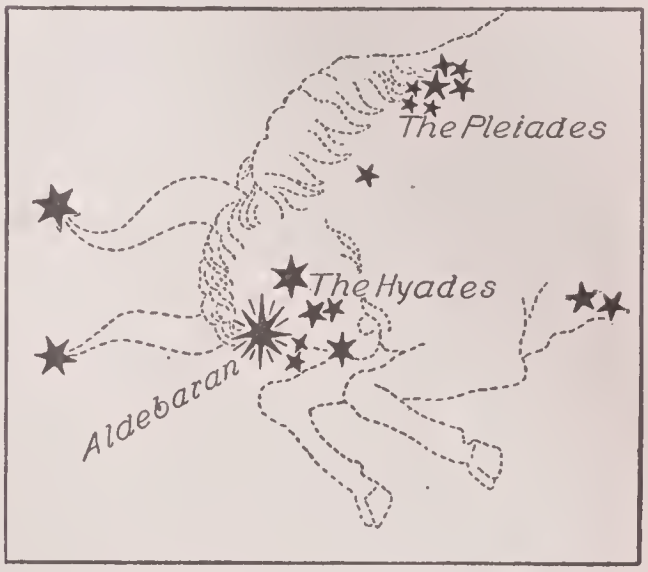
**TAUNTON,** *tahn'tun,* MASS., one of the county seats of Bristol County, is a manufacturing city in the southeastern part of the state, thirty-six miles south of Boston and seventeen miles northeast of Providence, R. I. It is on the Taunton River, which has been sufficiently deepened for river commerce at high tide, and is served by the New York, New Haven & Hartford Railroad and by an extensive interurban system. Taunton includes the villages of Hopewell, Britanniaville, Oakland, Whittenton, East Taunton and the Weir (which is the city's port), and covers an area of over forty-four square miles. The population in 1910 was 34,256; in 1916 it was 36,283 (Federal estimate).

Taunton Green, the town square, is in the heart of the business section. The more prominent buildings are the county courthouse, built at a cost of $300,000, the Federal building, Registry building, city hall, Y. M. C. A., Historical Hall and the Carnegie Library. The Morton Hospital, Old Ladies' Home and the State Insane Hospital are important institutions, and there are many old colonial buildings of historic interest. Taunton is an important industrial center. More than 2,500 people are employed in making cotton goods, and other important products are stoves, silverware, machinery, oilcloth and aluminum goods. The city has a large coastwise trade and during certain parts of the year is the headquarters of a considerable fishing business. The first crucibles for copper smelting cast in the United States were made here, and Taunton long supplied the government with copper disks for making one-cent pieces.

A settlement called Cohannet was founded on the site in 1638. Many of the settlers were from Taunton, in England, and the place was incorporated as a town under that name in 1639. It was chartered as a city in 1865. C.W.L.

**TAURUS,** *taw'rus,* THE BULL, the second sign of the zodiac, into which the sun enters about April 20. The symbol of this sign is ♉. The constellation Taurus contains altogether about 140 stars, and in the northern hemisphere is overhead in December and January. The most remarkable star is Aldebaran, a red star of the first magnitude, which is shown in illustrations as blazing in the head of the Bull. The V-shaped cluster of Hyades forms the face of the Bull, the Pleiades being also in this constellation. In the Pleiades are nearly 100 stars, but only six are visible to the naked eye, the brightest being called Alegone.

**In Mythology.** The Bull, according to legends, is the bull into which Jupiter transformed himself when he carried away Europa, who became mother of Minos and grandmother of




THE CONSTELLATION TAURUS
The sizes of the stars indicate their relative magnitude.

Deucalion, the Noah of the Deluge. In the ancient astronomy of India and Chaldea, the Bull also appears long before the Greek era. The Pleiades were the seven daughters of Atlas, all immortal except one, who gave up her immortality for love of a man, and whose brightness has vanished. The Hyades were half sisters of the Pleiades; by poets they are always called the "rainy Hyades." F.ST.A.

For additional illustration showing position in the heavens, see ASTRONOMY; for explanation of magnitude, see STAR, subhead *Magnitude.*

**TAURUS,** a mountain range or series of ranges, in Southern Asia Minor, extending along the Mediterranean coast from the Euphrates River in the direction of the Aegean Sea. The mountains form the southern boundary of the Anatolian Plateau, which occupies the central part of the peninsula of Asia Minor. Many peaks more than 10,000 feet in altitude rise in the Taurus ranges. An extension of the mountains on the northeast is known as the Anti-Taurus.

**TAX AND TAXES.** That portion of private wealth or income demanded by a government for the payment of its expenses is a *tax;* the money paid for such purposes is called *taxes.* Every nation or governmental unit must have

funds with which to meet its public expenses, such as the salaries of officers, the construction of public improvements, the support of the police and of the army and navy. In order to obtain such revenue, a certain percentage of the wealth of those who reside within the nation's boundaries is demanded by that nation. In other words, the money to conduct the government comes from the people.

Such a means of securing revenue has been employed from the earliest days of civilization. Many inscriptions testify that taxes were collected in Babylonia, Egypt and other countries of antiquity, while in both the Old and the New Testament there is frequent reference to taxgatherers, or "publicans." In Europe, during the Middle Ages, most governments were supported chiefly from the income of lands owned by the government (public or national domain) or by the ruler himself; there were some regular taxes and numerous special fees, but a state system of taxation was practically unknown. In the European cities of the period, however, local taxes were collected with considerable system and regularity, and in many of these centers only taxpayers were allowed the privileges of citizenship.

**Kinds of Taxes.** Taxes are of two kinds, *direct* and *indirect*. A direct tax is levied on the persons or the property upon which it is planned to rest, while an indirect tax is levied in such a way that its burden can be shifted or divided. In general, it is true that national governments are supported by indirect taxation, whereas local governments are maintained by direct taxation.

The simplest form of direct tax is a poll tax, literally a tax per head, each head, or person, limited to males of voting age, paying an equal amount. Formerly an important source of income, the poll tax has been generally abandoned. A more important form is the tax on real estate and on personal property; this tax, in various forms, is adopted to-day in all civilized countries. In former days, when property was less complex, the property tax was satisfactory; in a modern, more highly developed society, in which there is much property which can be hidden from taxing bodies, it has serious defects. It may allow huge amounts of property to escape taxation entirely—for example, stocks and bonds—and it does not divide equitably the burden of taxation. For this reason there have been numerous suggestions of substitutes, the most important being the single tax. There is also the income tax, which in theory is ideal, in that each person pays according to his ability. The difficulty of collecting income taxes, however, has greatly restricted their use. Much easier to collect is an inheritance tax, but not sufficient revenue could be derived from this source alone.

One of the chief troubles in adjusting a tax is the fact that it does not always fall on the persons who the government proposes shall pay it. Thus the owner of a house, if he lives in it, pays his own taxes, but if he leases his house to another he will add the taxes to the rent. Again, a cigar manufacturer must place a revenue stamp upon each box of cigars, but he carefully considers this tax before setting a price on his products. These taxes thus become *indirect*. The most important indirect taxes are customs duties and internal revenue taxes. These are the chief sources of the revenue of most nations.

**Theory of Taxation.** It is just that a citizen should pay some revenue to a government which protects him and guarantees that he shall live practically unmolested in the enjoyment of his talents and property. Until about 1850 economists generally assumed that taxation was the price of protection. This view meant that taxes should be apportioned according to the benefit received, or according to the expenses incurred by the state in creating conditions which yield this benefit. This theory was weak in that neither the benefit nor the expenses could be figured exactly. In actual practice, taxation is now based on the theory that each individual is under obligation to contribute in proportion to his means and ability. This is an obligation derived not from special benefits, but from the very fact of his existence as a member of a civilized state.

Economists add several other characteristics to taxation. A tax should be in proportion to the means of the taxpayer, but it should not be so heavy that it discourages initiative. For example, if every factory employing more than twenty men were taxed one-third of its annual income, the manufacturer would soon close his shop. A tax should not be so heavy that it amounts to confiscation, but under special circumstances it should permit of great expansion. In war times taxes might be doubled or trebled; under other conditions they might be reduced. A system of taxation should be flexible and accommodate itself to conditions from year to year, but this flexibility should not cause additional expense. It is right that a

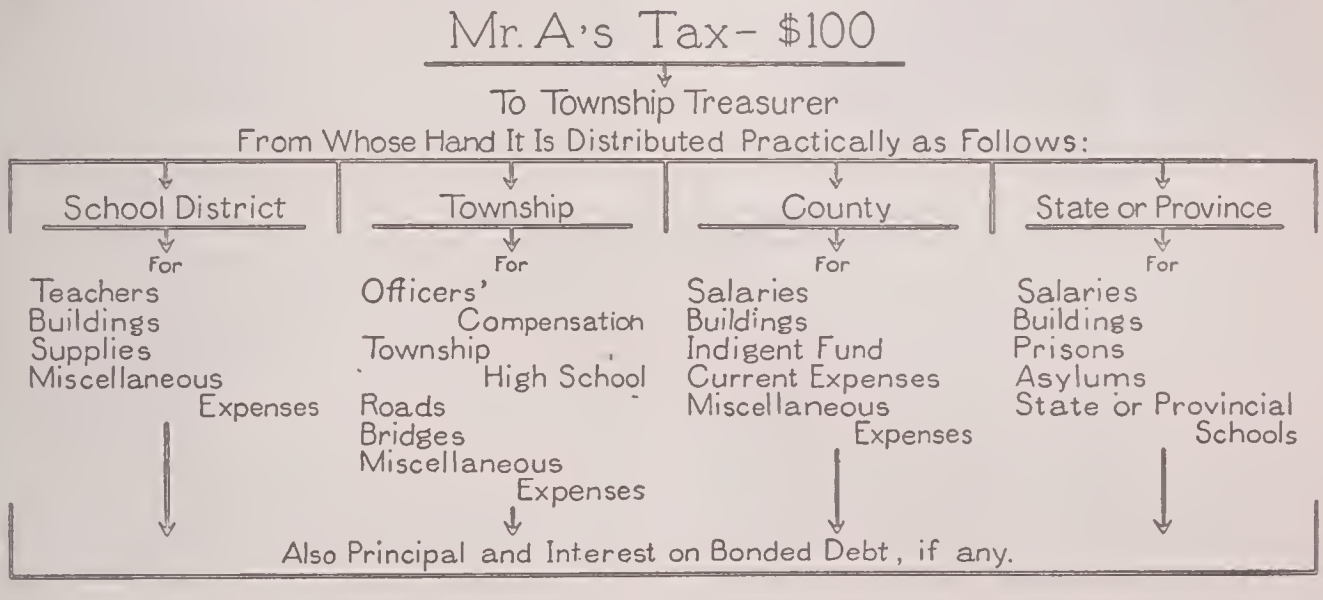
citizen should pay taxes, but the expense of operating the machinery of taxation should not add to his burden.

**Taxation in Practice.** *Local Taxation.* In the United States the state and its subdivisions raise money only by direct taxation. All of the states have a general property tax, some of them have inheritance taxes, others have income taxes, and a few still have the poll tax. Inheritance, income and poll taxes provide useful additions to the revenue of a state, but their uncertain character has so far prevented their adoption as the mainstay of a state system of taxation. In all the states the general tax on property is the chief source of income for all the units of government.

Before any money can be raised by property taxes, two fundamental questions must be answered—first, what is the value of the taxable property, and second, how much money is needed. The first question is answered by the assessors. Every owner of real or personal property is required by statute to file with the assessors a statement of his property together with its "fair cash value." On the basis of these schedules and on the results of their own investigations, the board of assessors fixes the amount on which the owner is taxed. If the owner feels that the assessed valuation is too high he may ask the board of review to reduce it.

The second question is not answered so easily, because the tax paid by an owner, whom we may call Mr. A, is distributed among several governmental units approximately as indicated in the diagram below.

The most important man in this system is the township treasurer; (in some states, however, the taxes are paid to the county collector or treasurer). All taxes are paid first to him, and are properly distributed by him. The taxpayers of a township must first pay the expenses of their township. But each township, being a part of the county, bears its share of the expenses of county government. The state, too, calls on each county for its share of the funds which shall maintain the state government. The amount of money which each unit is required to pay to the next higher unit is determined by the county board and state board of equalization in proportion to the taxable property in each unit. Thus the state is really supported by the counties, which are supported in turn by the townships. It must be remembered, however, that the county and the township are created by the state; they tax in their own name, but they derive their authority from the state. The total amount needed for all purposes, divided by the assessed value of the property in the state, determines the tax rate; for example, if $1,000,000 is needed for all expenses, and if the value of all property is $200,000,000, the tax rate is $\frac{1{,}000{,}000}{\$200{,}000{,}000}$ or $\frac{1}{200}$, or one-half of 1 per cent. Standing somewhat aside from these other units is the school district, which is a division of the township or county for school purposes; in practically all states the voters in a school district pay special taxes to support the schools in that district.




The Canadian tax system shows one important difference from that of the United States. In the latter the individual state receives most of its income from a direct property tax; in Canada the province, which is the corresponding division, levies no general property tax, but receives most of its income in the form of a subsidy from the Dominion government. As

in the states, the provinces levy special taxes, such as those on incomes and inheritances, and also derive some revenue from royalties and special license fees of various kinds. All local or direct taxes, however, are levied by and for the local units. The list or "roll" of the assessors gives the value of all the taxable real and personal property. The municipal council levies a tax on this property sufficient to pay the debts and expenses of the government. In case a taxpayer feels that he is assessed or "rated" too high, he may appeal for a reduction to a court of revision, usually composed of members of the local council, and finally to the regular courts of the province.

**National Taxation.** In Canada the Dominion government levies no direct taxes, and in the United States only the income tax is a national direct tax, and that only since 1913. Both Canada and the United States derive most of their revenue from customs duties and internal revenue. In a technical sense the United States income tax is a direct tax, but it falls on such a small part of the people that it still remains true that both national governments are supported by indirect taxation. Some idea of the importance of trade and commerce may be gained from the fact that the United States government derives one-third of its income from customs dues and one-third from internal revenue, and the Dominion government receives two-thirds of its total income from customs duties alone. If the customs duties, for any reason, should be greatly lessened or totally disappear, radical changes in the system of taxation would be inevitable. W.F.Z.

Consult Adams' *Public Finance;* Daniel's *Elements of Public Finance;* Judson's *The Taxing Power.*

**Related Subjects.** In connection with this discussion of taxes the reader may consult the following articles in these volumes:

| | |
|---|---|
| Assessor | Internal Revenue |
| Customs Duties | Poll Tax |
| Free Trade | Single Tax |
| Income Tax | Tariff |
| Inheritance Tax | |

## *The Mathematics of Taxes*

The amount of tax levied by the government depends upon the expenses it must meet. The *rate* of tax depends upon the expenses to be met and the value of the property to be taxed. For example, the town of D has taxable property assessed to $10,000,000, and the tax to be raised is $275,000. The rate of tax is 2¾% or 2¾ cents on the dollar, or 27½ mills on the dollar. The rate is the relation of the tax to the assessed value of the property, as shown below:

$$\text{Rate} = \frac{275\cancel{000.00}}{10000\cancel{000}} = \frac{275}{10000} = 2\tfrac{3}{4}\%$$

$$\text{Tax on } \$1 = \frac{\$275000.00}{10000000} = \$.02\tfrac{3}{4}$$

In the town of D a person owning property assessed at $16,500 will pay in taxes .02¾ of $16,500 or $453.75.

**Problems.** 1. There is to be raised in a certain town for a new school a tax of $8000; the assessed valuation of property is $400,000. What is the rate of taxation? What is the tax of Mr. James, who owns property assessed at $1,350?

Solution:

Tax = $8000

Assessed valuation = $400000

$$\text{Rate of tax} = \frac{\cancel{8000}^{\,2}}{\cancel{400000}_{\,100}} = 2\%$$

Mr. J's tax = .02 of $1350 = $27

2. In a certain large city the tax needed was as follows: for the state $1,300,150, for the county $1,800,000, for the city $5,478,300, for the schools $6,000,000, for the parks $1,500,800. The city property was valued in full at $1,286,340,000. Property was taxed on ⅓ of full value. What was the rate of taxation? What was the tax of Mr. N, who had property valued at $7500, full value?

Solution:

| | |
|---|---|
| State tax | $ 1,300,150 |
| County tax | 1,800,000 |
| City tax | 5,478,300 |
| School tax | 6,000,000 |
| Park tax | 1,500,800 |
| Total | $16,079,250 |

$$\text{Assessed property value} = \frac{\$1,286,340,000}{5} = \$257,268,000$$

$$\text{Rate} = \frac{\$16,079,250.00}{\$275,268,000} = .06\tfrac{1}{4}$$

$$\text{Assessed value of Mr. N's property} = \frac{\$7500}{\$5} = \$1500$$

Mr. N's tax = .06¼ of $1500 = $93.75

3. In the town of E a tax of $20,000 is needed; there are 380 polls, each paying $2. How large a property tax must be raised? Ans. $19,240.

4. If the rate of tax is $13 on every thousand dollars' valuation, what is the tax of a person owning property valued at $7000?

5. At $1.75 on $100, what is the rate of tax in per cent? What is the tax on property assessed at $8000? Ans. 1¾%; $140.

6. The rate of state tax is 1 mill, of county tax 3½ mills, of town tax 4 mills. What is the tax of a property owner in that town on property assessed at $8000?

Solution:
Rate = .008½
Tax = .008½ × $8000 = $68

**Problems Involving Duties.** 1. What is the duty on a shipment of perfumery bought in Paris for $420, weighing 125 pounds, ad valorem duty 50% and specific duty $.60 per pound?

Solution:
Invoice price = $420
Ad valorem duty = .50 × $420 = $210
Specific duty = 125 × $.60 = $ 75
Total duty = $285

2. The duty on canned fish is 30%. What is the cost to the merchant of importing a lot of sardines costing $625 in Italy?

Invoice price = $625.00
Ad valorem duty = .30 × $625 = 187.50
Total cost = $812.50

3. The ad valorem duty on a shipment of gloves at 60% was $172.50. What was the invoice price of the lot?

Ad valorem = $172.50
Rate = 60%
$172.50 = .60 × invoice price
$$\text{Invoice price} = \frac{\$172.50}{.60} = \$287.50$$

SUGGESTIONS AS TO TEACHING THE SUBJECT. (a) Students should get a good knowledge of relations of people and government, needs of the government, public obligations, etc.

(b) They should find out the many needs for money in their own school district, village, city and so on.

(c) They should see how the assessor, collector and treasurer get office, etc.

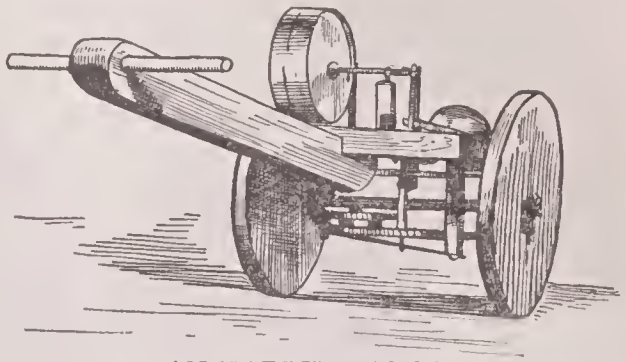
(d) They should discuss the rate of tax in their own locality.

(e) They should know something of the tariff system historically.

(f) They should know that the invoice price of imported goods is found in the manifesto from the office of the American consul at the foreign city from which the imported goods are shipped to this country.

(g) In general, students should have an intelligent grasp of the *civil, social and industrial conditions that give rise to tax problems.* American tariff schedules can be secured by writing to the Department of the Treasury at Washington. Students should obtain these. A.H.

**TAXICAB,** *tak'si kab,* a public motor vehicle used chiefly in cities to carry passengers for hire. It is an example of specialization in automobile making, and is rapidly taking the place of the cab or coach drawn by horses. High-grade taxicabs are fitted with all possible comforts for the passengers, such as drop seats for children, side pockets for papers and programs, opera glass and cigar holders and electric lights. These vehicles are equipped with *taximeters,* automatic devices which register the mileage covered and record the amount of the fare. Rates are fixed by city ordinances, and fares are collected on the basis of the distance covered or according to the time consumed. There are other regulations as to number of passengers, seating capacity of vehicle, time used in waiting for passengers, time lost because of breakdowns, etc.



AN EARLY TAXICAB

A Chinese public conveyance, three centuries old. It was provided with a mechanical register in the form of a drum, which was beaten by a hammer at the end of each mile.

Generally speaking, rates in Europe are lower than in the United States. In the latter country the city of Chicago taxicab service offers the lowest rates. One company carries one passenger one-half mile for twenty cents, with a further fee of five cents for each added quarter mile. Only ten cents each is charged for each additional passenger for the full trip.

**TAXIDERMY,** *tak'si der mi.* The visitor in a zoölogical museum is usually impressed by the natural appearance of the mounted animals exhibited. Often these are shown much as they lived in their native haunts, that is, in a picturesque setting of woods or water. Birds, fish, squirrels and larger woodland mammals, and wild beasts of the jungle, even elephants, are exhibited in a most realistic manner. The science by which animals are thus preserved and represented is known as *taxidermy,* a term derived from two Greek words meaning *arrangement* and *skin.*

As taught at the present time, taxidermy is a complicated art which compels one who would master it to acquire a considerable knowledge of anatomy, natural history, drawing, carving, sculpture, mechanics, tanning and dyeing. As a preliminary step the student

must have a thorough understanding of animal forms and expressions, and such knowledge is gained through lessons in drawing and modeling, through the detailed study of casts and portions of dead animals and the study of live specimens. Ward's Natural Science Institute, at Rochester, N. Y., is the most famous taxidermic school in the United States, and most of the American museum experts have been graduated from this establishment. An excellent taxidermic department is also maintained by the United States National Museum, at Washington.

The complete process of mounting is about as follows: By means of a special method of cutting, the skin is removed from the body, even to the ends of the toes and the tips of the ears. This stripping is done so skilfully that there is no injury or disfigurement of the fur, hair, feathers or scales, as the case may be. After the skin is removed it is treated with some preservative compound, such as arsenical soap. When mammals are mounted accurate measurements of the skin are made, and a drawing is worked out which shows the location of muscles, ribs and hollows. This copy is used as a guide. Next a manikin corresponding to the body of the animal is constructed by covering a framework of wire and excelsior with clay, plaster or papier-mâché. The modeling of such a figure must be done as carefully as if it were intended to be a sculptor's model. Finally, the skin is put on the manikin, and is carefully sewed together at the points where slits were made in stripping it from the body.

The details as to shaping the ears, putting in the eyes, tongue, lips, etc., and otherwise accurately reproducing the animal are numerous and complicated. Glass eyes are no longer used; they have been replaced by hollow globes painted so as to give a natural expression. There are special processes for the mounting of birds, fishes and reptiles, but these follow in general the methods given above. M.R.T.

Consult Hornaday's *Taxidermy and Zoölogical Collecting;* Rowley's *The Art of Taxidermy.*

**TAY,** *ta,* the longest river of Scotland, with a length of 118 miles, that carries more water to the sea than any other stream in Great Britain. It rises in Ben Lui, a mountain on the boundary between Perthshire and Argyllshire, flows through Loch Tay, passes Dunkeld, Aberfeldy, Perth and Dundee, and enters the North Sea through the broad estuary known as the Firth of Tay. The principal tributaries on the right are the Almond, Earn and Bran; those on the left are the Lyon, Isla and Tummel. In portions of the river dangerous floods have occurred at various times. Navigation is seriously obstructed by shifting sandbanks and swift currents, but the river is navigable to Perth for small vessels, and the largest ships reach Dundee at all stages of the tide. An iron railroad bridge over two miles long spans the estuary. The Tay is one of the most beautiful of Scotland's many picturesque rivers, and it also enjoys great repute as a salmon stream; at Hormontfield, near Perth, there is a hatchery for the breeding of these fish.

**TAYLOR,** [James] Bayard (1825-1878), an American poet, essayist and traveler, born at Kennett Square, Pa., of Quaker ancestors. He received only a high school education and began life as a printer. When but twenty years old he made a visit to Europe, in the course of which he tramped from place to place and supported himself by writing letters, which were afterward published in book form under the title *Views Afoot.* He was a born traveler, and journeyed in his later years in Asia Minor, Egypt, China, Japan and various countries of Europe, and wrote many volumes descriptive of the scenes and peoples he visited. During the War of Secession he was secretary to the legation at Saint Petersburg, and in 1878 he became United States minister to Germany. He died in Berlin.

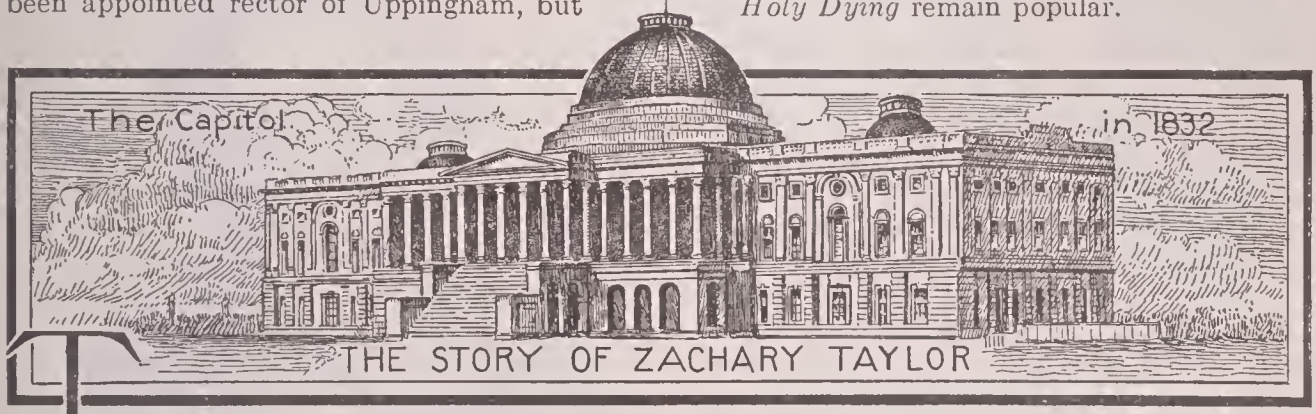
BAYARD TAYLOR

Taylor's most famous work is his translation of Goethe's *Faust,* which is probably the best in the English language. It was, however, his travel volumes which won him widest reputation during his life and for which he is most generally remembered. His own great ambition was to be known as a poet; but while his works all show poetic talent, and some of them, as the *Bedouin Love Song,* have retained their popularity, they lack the indescribable quality that would make them really great. Among his works are *El Dorado,* a description of California in the days of gold seeking; *By-Ways of*

*Europe; A Visit to India, China and Japan;* four novels, of which *Hannah Thurston* is the best; and the volumes of poems: *A Book of Romances, Lyrics and Songs; Poems of the Orient; Lars, a Pastoral of Norway; The National Ode,* and *Prince Deucalion.*

**TAYLOR,** JEREMY (1613-1667), an English preacher and author, born at Cambridge and educated at Caius College. Gaining the favorable notice of Laud, he was accorded a fellowship at All Souls', Oxford, and was made chaplain to Charles I, to whose cause he remained loyal throughout all the years of the civil war, which ended in the execution of the king in 1649.

Before the outbreak of the struggle he had been appointed rector of Uppingham, but he lost that post, and during the early part of the war was in the royal army as chaplain. For a time he was imprisoned in Wales and after his release remained in that country, teaching school and writing. It was here that his most famous works were produced: *The Liberty of Prophesying,* the *Life of Christ, Holy Living* and *Holy Dying.* At the Restoration he was made bishop of Down and Connor, in Ireland, and notwithstanding his position there was rendered unpleasant he remained, faithful to his duties, until his death. His works, especially his sermons and his *Holy Living* and *Holy Dying,* are models of eloquence, and they abound in poetic imagery and evidences of a rich and fertile imagination. *Holy Living* and *Holy Dying* remain popular.




## THE STORY OF ZACHARY TAYLOR

**TAYLOR,** ZACHARY (1784-1850), an American soldier and statesman, twelfth President of the United States. Taylor was the second President to die in office, William Henry Harrison being the first, only nine years earlier. His untimely death, coming only sixteen months after his inauguration, cut off his political career at its very beginning, for he had held no political office of any kind previous to the Presidency. He was a soldier for forty years, and it was his reputation as the hero of the Mexican War that was the decisive factor in making him President. Without political training, he saved himself through his courage, his conscientiousness and his good judgment. These carried him through difficulties in which the training of the politician would have been worthless. Conscious of his inexperience, he relied on the advice of others, but his judgment kept him steady amid confusing, conflicting channels. Had he lived to serve out his term the soldier would almost surely have proved himself a statesman of a high order.

Zachary Taylor was born in Orange County, Virginia, on September 24, 1784. He was the third son of Colonel Richard Taylor, a Revolutionary officer. At the close of the war, Colonel Taylor retired to his Orange County plantation, but in 1785 he removed to Kentucky, which was then part of Virginia, and took up a farm near the present city of Louisville. Of formal schooling young Zachary had none. The new settlement offered few opportunities for scholastic training, but it did teach thrift, industry and self-denial. It also taught many things about war and military life, for many of Colonel Taylor's neighbors were Revolutionary soldiers who had received grants of land from Virginia. Before the colonel's wide hearth were told stories of the dark days of the Revolution and reminiscences of brave deeds. Undoubtedly this military past had its influence on the Taylor boys, for all but one of the five joined the army.

**Early Career in the Army.** During young Zachary's early manhood the United States became involved in disputes with France and Great Britain over the rights of neutral commerce and other matters affected by the Napoleonic Wars. In 1808 the status of these disputes seemed to point to immediate war with Great Britain. Congress authorized an increase in the size of the army, and of one of the new regiments, the Seventh Infantry, Zachary Taylor was appointed first lieutenant. Two years later he was promoted to the rank

of captain, and about the same time was married to Miss Margaret Smith, the daughter of a Maryland planter.

In June, 1812, war was declared against England. This action made it almost certain that the Indians allied with the British would begin raids. One of the points of attack would be Vincennes, on the Wabash River. To protect Vincennes from a surprise attack, Captain Taylor with his company of fifty men was ordered to Fort Harrison, a stockade on the river above Vincennes. Here the little force was attacked by a large band of Indians, led by Tecumseh; it was beaten off so effectively that for months afterward no Indians could be found in this section. For the defense of the fort Captain Taylor received the brevet rank of major, which was later confirmed by commission. Major Taylor was in active service against the Indians in the Wabash and Rock River valleys until the close of the war.

**Indian Campaigns.** At the close of hostilities, because of changes in the army organization, Taylor was reduced to the rank of captain. Regarding this as an injustice, he resigned his commission and returned home. Some influence, not stimulated by himself, secured his restoration to the rank of major. As lieutenant-colonel he later commanded at Fort Snelling, then the border post of the Northwest, and as colonel was in charge of Fort Crawford, at Prairie du Chien (Wisconsin) when the Black Hawk War began. Colonel Taylor served through the campaign, and himself received the surrender of Black Hawk. Four years later, in 1836, he was sent to hold a command in Florida, and in 1837 defeated the Seminole Indians in the decisive Battle of Okechobee, a victory for which he received the brevet rank of brigadier-general. In 1838 he assumed chief command in Florida, and in 1840 was assigned to command the southern division of the western department of the United States army.

**In the Mexican War.** As the commander in this division, he was naturally given the task in 1845 of defending Texas from the threatened invasion by the Mexicans. Texas had entered the Union, so it said, with the Rio Grande as its boundary; it asked protection for this frontier, and General Taylor was to advance to that river. Collecting a force of about 4,000 men, both regulars and volunteers, at Corpus Christi, he advanced to the Rio Grande, and halted on its bank, opposite Matamoras. There the Americans built Fort Brown. General Ampudia, the Mexican commander, demanded that the Americans retire beyond the Nueces River, which they claimed as a boundary. Taylor promptly refused. In order to obtain more supplies, Taylor took half of his force to Point Isabel, his base, thirty miles away. On the second day of the return trip a force of 6,000 Mexicans opposed the further progress of his troops. Most of the officers were in favor of falling back to Point Isabel, to await reënforcements, but Taylor, after listening to the arguments, said: "I shall go to Fort Brown or stay in my shoes," a Western expression equivalent to "die with my boots on." Although out-

ZACHARY TAYLOR

One of those numerous Americans who were made national heroes by war and afterwards raised to high civil office.

numbered three to one, the Americans attacked early on the morning of May 8, 1845, and in the battles of Palo Alto and Resaca de la Palma routed the Mexicans, who fled across the Rio Grande and left open the way to Fort Brown. On May 18 General Taylor's force occupied Matamoras.

In the meantime, on May 13, war had been formally declared. General Taylor then prepared to advance into Mexico, as the Rio Grande was an unsatisfactory strategic boundary. With 6,625 men he marched against Monterey, which surrendered on September 24 after a three days' bombardment. By the terms of surrender the Mexicans agreed to retire behind a certain line, and the American troops agreed not to advance beyond it for eight weeks. This armistice was not approved by the United States government. Assuming, therefore, that

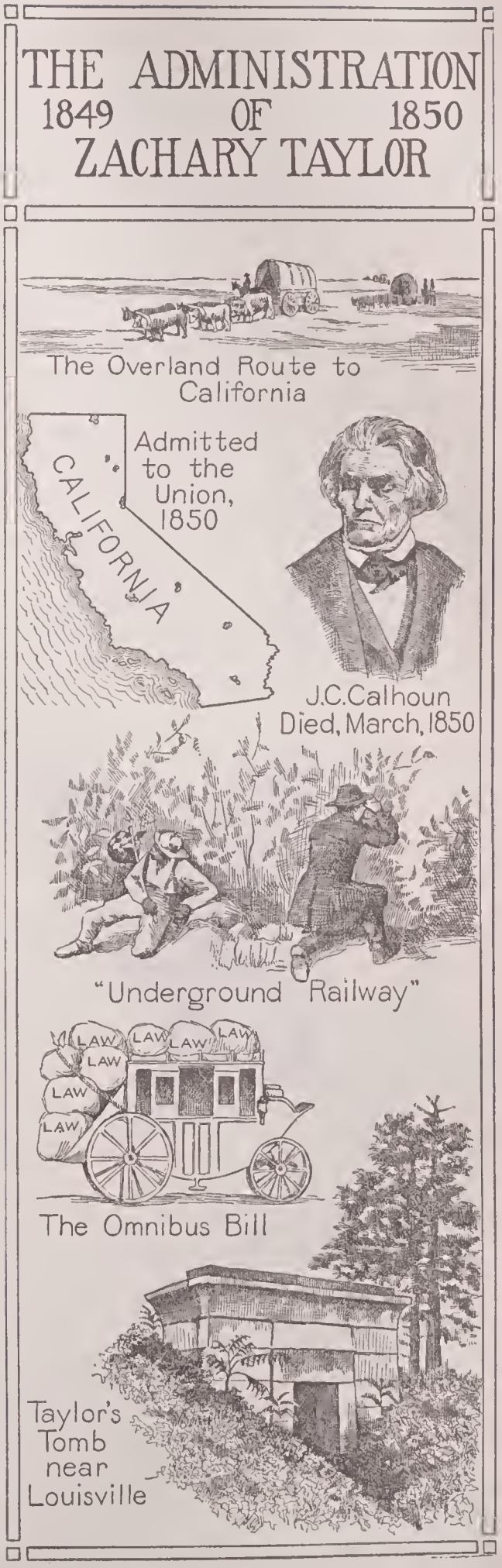
the government was planning a further invasion of Mexico, General Taylor made preparations to that end, and was all but ready to advance, when he learned that General Scott had arrived at Vera Cruz with orders to take such troops and supplies as he needed from Taylor's army. This was in the spring of 1847. Scott left Taylor only 5,000 unseasoned troops to oppose General Santa Anna's army of 20,000. Santa Anna saw his opportunity, advanced to the attack, and met Taylor at Buena Vista, to which the Americans had withdrawn. There General Taylor's army won a brilliant victory over a vastly superior force, a victory which aroused great enthusiasm and made Taylor a national hero.

As a soldier, General Taylor ranks high. In the words of one who knew him well and understood him thoroughly:

Unpretending, meditative, observant and conclusive, he was best understood and most appreciated by those who had known him long and intimately. In a campaign he gathered information from all who approached him, however sinister their motive might be. By comparison and elimination he gained a knowledge that was often surprising as to the position and designs of the enemy. In battle he was vigilantly active, though quiet in bearing; calm and considerate, though stern and inflexible; but when the excitement of danger and strife had subsided, he had a father's tenderness for the wounded, and none more sincerely mourned for those who had bravely fallen in the line of their duty.

When the Mexican War was over it seemed to General Taylor that the time had come to realize his dream of living again on a farm. In 1842, when he took command of the Southern division, he purchased a plantation near Baton Rouge, La., and later he planned to conduct a stock farm in the hills of Jefferson County. He had never felt any longing for political life, and he was always waiting for the day to come when he should be free to manage his private affairs. But his dream was not to be realized. His military career had made him a hero—"Old Rough and Ready," he was called. His popularity was seized by the Whigs to help preserve the party. As the Presidential campaign of 1848 approached the Whigs had three possible candidates—Clay, Scott, and Taylor. Clay was still the party leader, but he had already been defeated three times. Scott had been a Presidential possibility for a quarter of a century, and there were good arguments against him.

There remained Taylor, who easily outshone Scott as the popular hero of the war. He was not the fittest candidate the Whigs might have

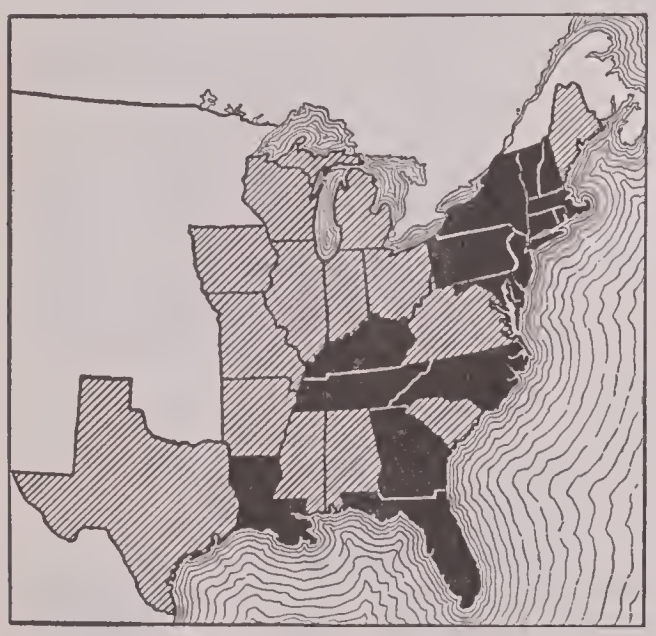


chosen, but he was the strongest. With him as its candidate the Whigs won their second and last victory in a Presidential election. Taylor received 163 electoral votes to 127 votes for Lewis Cass, the Democratic candidate. The popular vote was close: 1,360,101 for Taylor to 1,220,544 for Cass. Van Buren, the Free-Soil candidate, received 291,263 popular votes, but no electoral votes. The campaign was fought without much enthusiasm, and practically without an issue. Neither of the two great parties made an effort to rally the people to the defense of any important principle. As one historian remarks, somewhat sarcastically, practically the only thing it decided was that a Whig general should be made President because he had done effective work in carrying on a Democratic war.

## *The Administration of Zachary Taylor*

As President, Taylor had no friends to reward and no enemies to punish. He chose for his Cabinet men of national reputation, not one of whom was personally known to him. All the members of his Cabinet were lawyers, and all had served either in the Senate or in the House of Representatives. John M. Clayton, of Delaware, as Secretary of State, and Reverdy Johnson, of Maryland, as Attorney-General, were the best known of the group.

**Clayton-Bulwer Treaty.** The settlement of the Oregon question and the acquisition of



ELECTION MAP OF 1848

States in black gave their electoral votes to Lewis Cass, Democrat; shaded states voted for Taylor, Whig. White area south of Canada and north of Mexico was unorganized territory.

California naturally gave a new importance to the old plan of a water route across the Isthmus of Panama. In 1849 Nicaragua granted to a company of United States capitalists a concession for an isthmian canal, on condition that the United States should guarantee the neutrality of the canal and also the sovereignty of Nicaragua over the territory along its course. Then, in order to forestall British interference, the United States obtained the cession of the island of Tigre, in the Gulf of Fonseca, on the Pacific side from Honduras. This gulf was the probable Pacific outlet of the canal, but Great Britain already controlled the Atlantic end.

This complication made necessary a readjustment of the Anglo-American relations, and resulted in the Clayton-Bulwer treaty of 1850. The treaty was signed on April 18, and was ratified on July 5. By this agreement the two nations agreed to promote a canal across Nicaragua, and that neither would "ever obtain or maintain for itself any exclusive control over the said ship canal" or "assume or exercise any dominion . . . over any part of Central America." The "neutrality and security" of the canal was guaranteed so long as there should be no "unfair discriminations" or "oppressive exactions" in its management.

**The Compromise of 1850.** One of President Taylor's first acts was to send agents to California and New Mexico with instructions to urge the people of those territories to frame constitutions and apply for admission to the Union as states. But before the agents reached their destination, events had already moved in the desired direction. A convention was held in California in September, 1849, and a constitution was adopted which prohibited slavery. In Taylor's annual message, sent to Congress in December, there was reference to this movement in California to organize a state government, and to the prospect of similar action in New Mexico.

The first session of the Thirty-First Congress, in December, 1849, was remarkable for a fierce struggle over the Speakership, the difficulty lying in the fact that a small group of Free-Soilers held the balance of power and refused to vote either for the Whig or the Democratic candidate. In the course of this contest the fiercest sectional antagonisms were stirred up, and conservative men everywhere were becoming alarmed for the safety of the Union. It was then that Robert Toombs of Georgia said:

# OUTLINE AND QUESTIONS ON ZACHARY TAYLOR

## Outline

**I. Early Years**

(1) Birth and parentage
(2) Lack of education
(3) Effect of "war stories" in determining choice of vocation

**II. Military Career**

(1) Appointment as first lieutenant
(2) War of 1812
  (a) Defense of Vincennes
  (b) Made major by brevet
(3) Indian warfare
  (a) Reduction and re-promotion
  (b) Black Hawk War
  (c) War against Seminoles
(4) The Mexican War
  (a) Assigned defense of Texas
  (b) Encampment on Rio Grande
  (c) Battles of Palo Alto and Resaca de la Palma
    (1) Superior Mexican forces
  (d) Occupation of Matamoras
  (e) Capture of Monterey
  (f) Coming of General Scott
  (g) Battle of Buena Vista
    (1) Superior Mexican force
  (h) Victories factor in determining future career

**III. Election of 1848**

(1) Possible Whig candidates
  (a) Reason for choice of Taylor
(2) Absence of sharp campaign
(3) Victory of Taylor

**IV. Administration**

(1) Choice of Cabinet
(2) Treaty with Nicaragua
(3) The Clayton-Bulwer Treaty
  (a) "Neutrality and security" of isthmian canal guarantced
(4) Compromise of 1850
  (a) Rising public sentiment
  (b) Great speeches on the question
  (c) Terms of Compromise
    (1) California admitted as free state
    (2) New Mexico and Utah organized as territories
    (3) Slave trade suppressed in District of Columbia
    (4) Fugitive Slave Law enforced
  (d) Immediate results
  (e) Later effects
(5) Death of President

**V. Summary**

(1) Character of Taylor
(2) Rank as soldier
(3) Political possibilities

## Questions

What does the expression "stay in my shoes" mean and under what circumstances did Taylor make use of it?

Quote from a speech which indicates clearly the degree to which a feeling of animosity between North and South on the slavery question had increased.

How did Taylor's rise to the Presidency resemble that of Grant? How did it differ from that of Harrison?

What connection did the head of the Confederacy have with Zachary Taylor?

What statesman during this administration wrote a great speech but was too weak to deliver it?

What was the occasion of this speech, and what other famous statesmen took part in the controversy?

With what famous Indian chief did Taylor come into conflict?

What battle really won for Taylor the Presidency, and what were the circumstances that made this battle such a triumph?

What was Taylor's popular nickname?

How did a treaty with Nicaragua make necessary a treaty with Great Britain, and what were its terms?

I do not hesitate to avow before this House and the country, and in the presence of the living God, that if by your legislation you seek to drive us from the territories of California and New Mexico, purchased by the common blood and treasure of the whole people, and to abolish slavery in this district, thereby attempting to fix a national degradation upon half the states of this Confederacy, I am for disunion.

In this grave crisis Henry Clay appeared in the Senate for the last magnificent effort of his career. On January 29, 1850, he introduced into the Senate eight resolutions, which, with some amendments, stand in history as the Compromise of 1850. Clay's great speech in support of the resolution was made on February 5 and 6. Calhoun's reply came on March 4. It was read by Senator James Murray Mason of Virginia, for Calhoun was at the grave's edge and too weak to deliver it, but the veteran sat bravely in his seat. It was Calhoun's last public work; he died on March 31. Three days after Calhoun's speech, Webster delivered the Seventh of March speech, and in later weeks William H. Seward and Salmon P. Chase, newcomers in the Senate, were heard.

In April the resolutions were referred to a committee of which Clay was chairman, and on May 8 the committee reported two bills which would accomplish all that Clay wanted. One of these measures, the "Omnibus Bill," provided for the admission of California, for the organization of New Mexico and Utah as territories, for a Texas boundary which would exclude any territory claimed by that state in New Mexico. The second bill provided for the suppression of the slave trade in the District of Columbia and for a more effective enforcement of the Fugitive Slave Law. Before much progress was made with these bills, Taylor died suddenly, on July 9, 1850, after an illness of four days. His remains were placed in the family cemetery near Louisville, Ky.

The two bills as drafted by Clay met little favor in Congress, but their substance was finally recognized as the necessary compromise. Special bills on each feature of the compromise were passed, in most cases by a large majority. Thus the final decision was postponed for another decade, when the fires which had flamed fitfully from time to time became a steady blaze. In that greater conflict President Taylor's only son, Richard (1826-1879), played a conspicuous part as a Confederate general. His son-in-law, the husband of Sarah Taylor, was Jefferson Davis.

Consult O. O. Howard's *Zachary Taylor.*

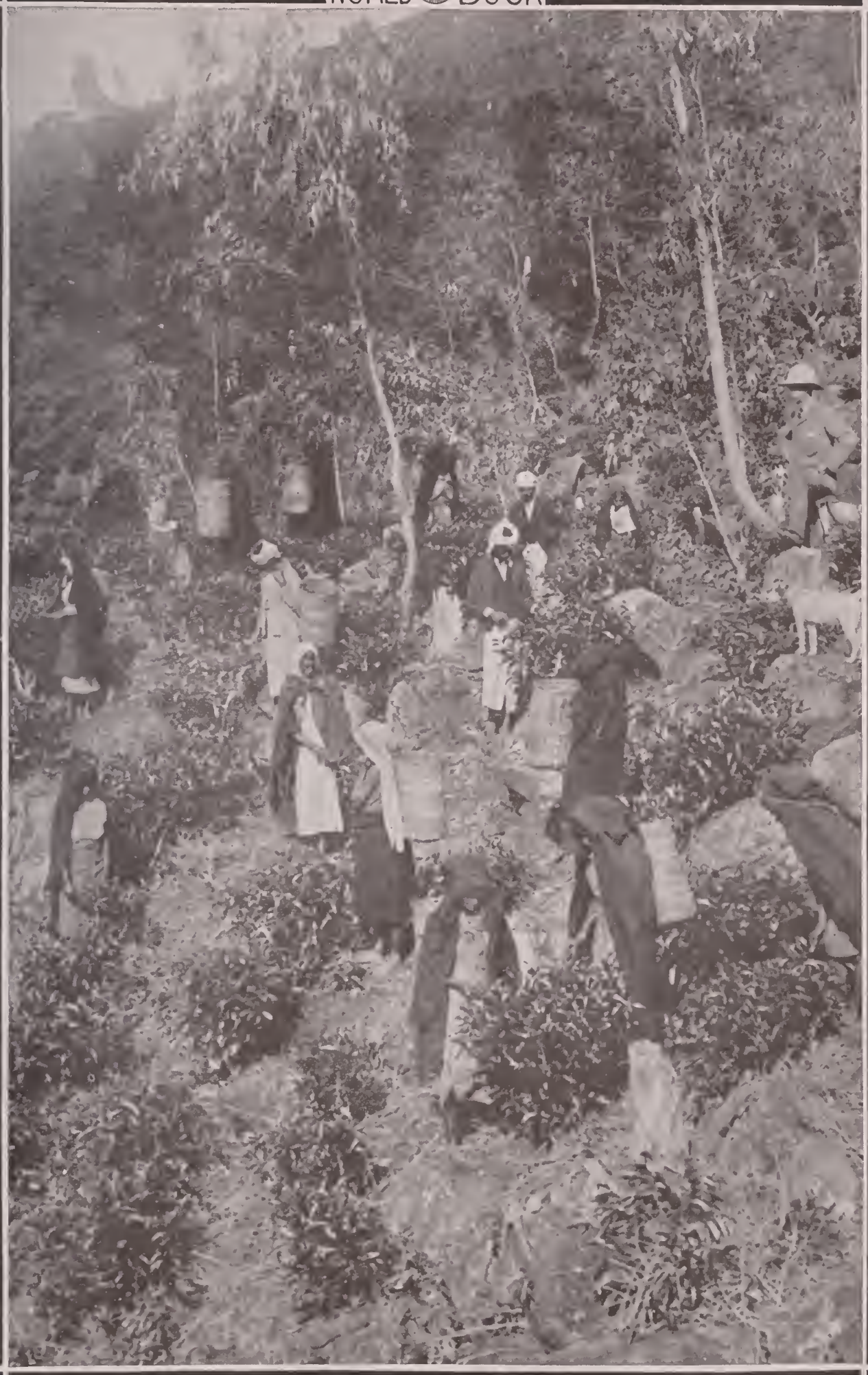
**TAYLOR,** Pa., a borough in Lackawanna County, in the northeastern part of the state, four miles southwest of Scranton. The Central of New Jersey and the Delaware, Lackawanna & Western railways provide railway transportation, and interurban lines operate in all directions from the city. Taylor is located in the Lackawanna Valley, famous for its yield of anthracite coal, and the mining and shipping of this product is the chief industry. The manufacture of silk is also important. In 1910 the population was 9,060; in 1916 this had increased to 12,077 (Federal estimate).

**TCHAD,** *chahd,* Lake, another and more ancient spelling for Chad, an African lake in the Sahara region, under which title a description is given.

**TEA,** a beverage brewed from the leaves of an Oriental evergreen tree, in popularity yielding only to coffee among unfermented drinks. Millions of people in all parts of the world use it daily, and it can almost be called the national beverage of Japan, of China and of England. For centuries it has been the custom of the English to stop all business in the middle of the afternoon while every one partakes of a social cup of tea, but it is said that this delightful custom was discontinued during the War of the Nations. When Japan and Russia contended for supremacy in Asia, in 1904-1905, the Japanese effectually warded off disease by drinking tea instead of water, for on the battle field it is difficult to obtain the latter in a pure condition. Tea, on the other hand, is a sterilized drink. In Japan itself social tea drinking is a ceremony having definite rules of etiquette.

Tea is associated with much that is delightful in life, but, like many other good things, it should be enjoyed in moderation. Its two principal constituents are caffeine and tannin. The former is mildly stimulating in small amounts, but produces injurious effects on the nervous system when taken in large quantities (see Caffeine). Tannin is a poisonous principle, and it is not soluble in water except when boiling is carried on for a long time. If one pours boiling water on the leaves and then pours out the tea as soon as it has acquired the desired strength and flavor, the beverage will not have the bitter taste that reveals the presence of tannin. When tea is properly made and is not drunk to excess it is harmless for most people.

**The Tea Plant.** Under cultivation, the tea plant, which belongs to the same family as the camellia, is a branching shrub from two to six



IN SOUTHERN INDIA.

Native tea pickers. They work twelve hours every day and receive about fifteen cents each.

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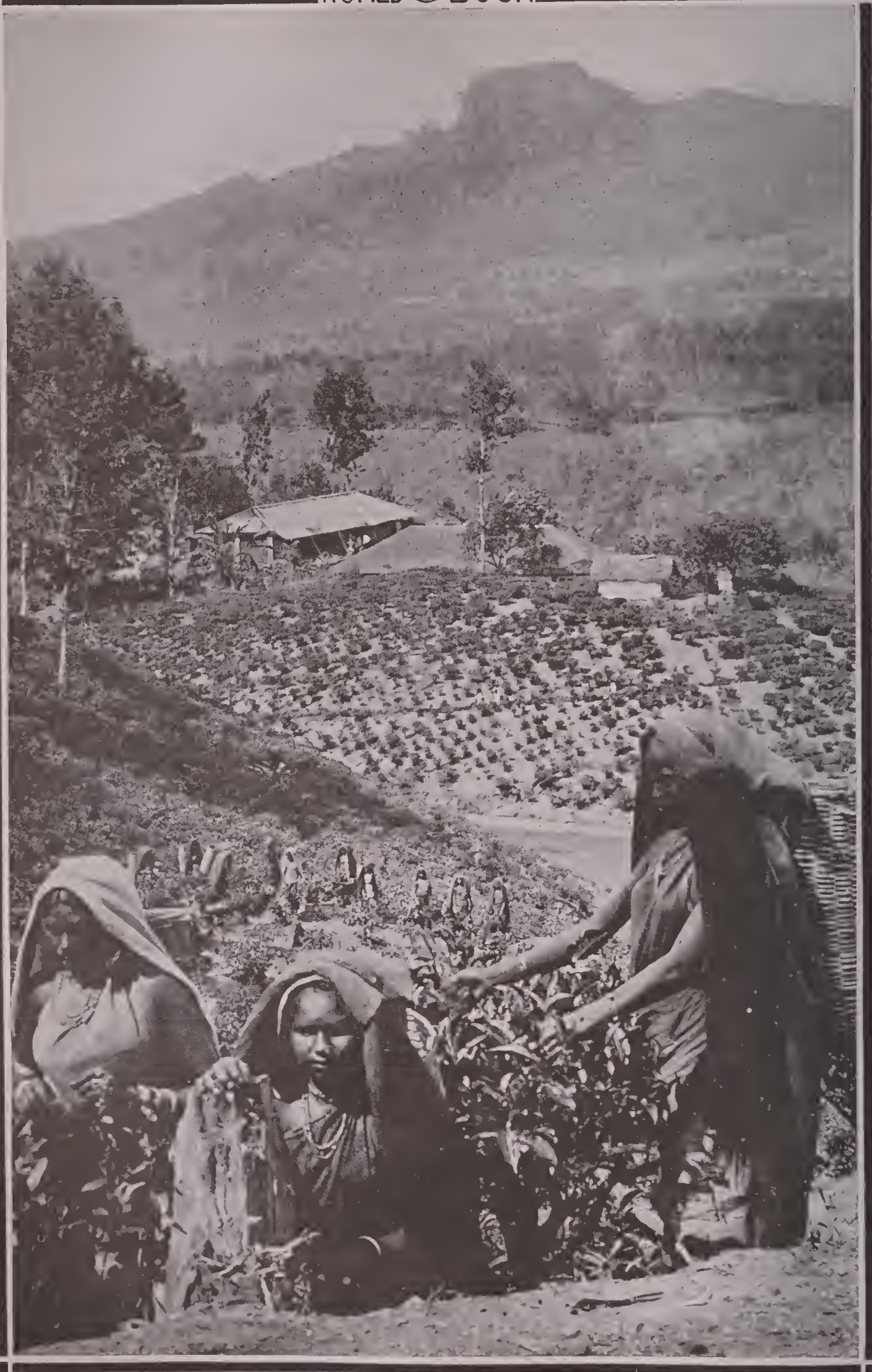

IN CEYLON.

Native girl tea pickers, on the largest ranch in the island, owned by Sir Thomas Lipton.

IN FORMOSA.

Weighing tea, preparatory to putting it in cases. Packing for shipment to America.

PICKING TEA IN JAPAN.

This scene of rare beauty does not suggest poverty, but some of the pickers are so poor they cannot afford to drink tea, except such as is brewed from rejected and nearly worthless leaves.

**IN THE ISLAND OF FORMOSA.**

Drying and sorting tea leaves for the American trade. Practically all of the tea grown in Formosa is sent to the United States.

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IN INDIA.

Native girls resting at noon from their tea picking. The stately trees are beautiful areca palms.

IN JAPAN.

Noon in the tea field. Tea served under the cherry blossoms. Below: The ceremonial tea, a national institution.

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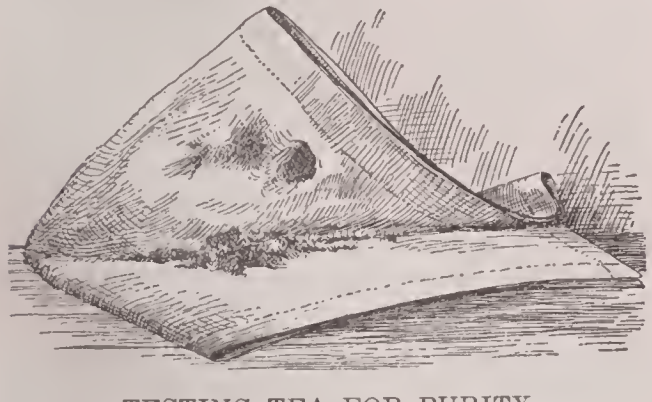
**HARD WORK IN CHINA.** This boy of twelve years carries eighty pounds of tea 400 miles to market and gets back home in twenty days. The father's pack weighs 350 pounds.

feet in height. On tea plantations it is kept to a small size by constant pruning, for the purpose of increasing the number of leaves, but in its natural state it grows as a tree thirty feet or more in height. The gardens or estates are planted to small bushes four or five inches high, which have been grown from seeds in nurseries. The small plants are set close together in rows, sometimes as many as 1,500 to the acre. At the end of three years a bush begins to be commercially profitable, but does not produce a full crop for at least two years more.

The chief tea-growing countries are Japan, including the island of Formosa, China, Ceylon, India and Java; a small amount of tea is raised in South Carolina. An abundance of rainfall and a hot climate are especially favorable to the production of this plant. In Japan and China the plants are grown in comparatively-small gardens, but in Java, Ceylon and India there are vast estates, some of which produce more than a million pounds of tea a year. A field in full blossom is a charming sight, for the rose-colored or cream-white flowers are very lovely against the background of green stems and thick foliage. The leaves of the plant are long and leathery, somewhat resembling those of the willow tree. The finest quality of tea is yielded by the young, tender leaves, while the older and coarser ones are utilized for cheap brands.

**Preparation for the Market.** The first step in the manufacture of tea is the picking of the leaves. This is done entirely by hand, and it is



TESTING TEA FOR PURITY

One of the most common adulterations of tea is the dyeing of the leaves to give them a good color. The fraud is not hard to detect. Place dry tea leaves between the folds of a clean, white cloth, and rub the folds together. If the tea is pure and has not been treated, no marks will appear on the cloth; dye stains will soil the cloth and be difficult to remove.

a work in which men, women and children engage. The leaves are dropped into baskets suspended from the shoulders of the workers, and as the baskets are filled the leaves are taken to the factory for curing. It is a somewhat prevalent idea that black tea and green tea are produced by two different varieties of plant, but the difference is wholly a matter of preparation. The green variety is what makers call *unfermented* tea, and the black is *fermented.* Fermentation in this instance means about the same as oxidation. In the case of fermented tea certain oxidizing ferments in the leaf are permitted to remain in it. These ferments work chemical changes in the leaf that give it its black color. At a certain stage in the process, when the organic nature of the leaf is on the point of being entirely changed, the fermenting is checked by the application of

EXPORTS OF A YEAR

heat. In case of unfermented tea the leaves are placed in a firing machine shortly after they are plucked, which prevents fermentation by closing the pores.

In black tea preparation the freshly-plucked leaves are placed under cover on bamboo, canvas or wire-netting trays, and left there for a day or two to wilt. After this they are crushed by being passed through powerful rolling machines, a process which brings the natural juices to the surface. The leaves are then spread out on tables in cool, well-ventilated rooms to ferment, as described above, after which they are again rolled, and then dried in the firing machines. Cutting machines now break up the pieces into uniform lengths, and the tea is finally sifted, graded and packed for shipment. Green tea is fired twice, the second firing occurring as soon as the leaves are taken from the rolling machines. The heating process drives off water present in the leaf and brings out the natural fragrance of the tea. Some teas are artificially scented by exposure to fresh flowers, and cheaper grades of green tea are frequently adulterated by the use of such coloring matters as powdered talc and Prussian blue. The accompanying illustration shows a reliable test for purity.

**Tea Exports.** The tea exported each year from the four chief tea-producing countries

## *A Booklet on Tea*

Use three sheets of paper 9 x 12 inches, or larger, and fold once, making twelve pages.

Cover page—*Story of Tea* in center; at bottom, name of pupil, grade and school.

Illustration: Border of conventionalized blossoms.

Inside cover—Blank.

Pages one and two—Original story, *My Visit to a Japanese Tea Field.* Describe general appearance of field and tea pickers.

Illustration: Sketch of field (see halftones herewith).

Page three—Description of tea plant.

Illustration: "Close-up" view of a single shrub.

Page four—Essay, *The Good Things about Tea.*

Illustrations: Teapots and teacups of various designs.

Page five—Essay, *The Evils of Tea.*

Page six—The Oriental story of the origin of tea, told in the pupil's own words.

Illustration: Man in Chinese or Japanese garb.

Page seven—Essay, *Preparing Tea for Market.*

Illustration: Trays on which leaves are dried.

Page eight—Where tea comes from.

Illustration: Diagram or map showing countries that lead in production.

Inside back cover—Blank.

Back cover—Quotations on tea.

amounts to nearly 750,000,000 pounds. Japan and Formosa, which are the most important producers of green teas, send the bulk of their output to the United States. Formosa also produces large quantities of *oolong* tea, a black tea with the flavor of green, which has been partly fermented. The United States and Canada buy a small amount of green tea from Ceylon, India and Java, but these countries are producers of black tea almost exclusively. Ceylon and British India supply the greater part of the English demand for black tea. China, which has a large American trade, produces both green and black varieties.

**The Story of Tea.** The Orient has a legend to account for the origin of tea. There was a saint in India, so the story goes, who watched and prayed for many years and then one day fell asleep. On awakening he was so grieved to think that he had let his weakness overcome him that he cut off his eyelids and threw them on the ground. They took root and grew into a shrub which since that time has had the power to keep the world awake. It is known that tea was used as a beverage in China as early as the sixth century, and was extensively cultivated in Japan in the ninth, but its virtues were unknown to Europeans until the seventeenth century, when it was introduced into Europe by Dutch adventurers who had learned about it from the Chinese. In the interesting diary of Samuel Pepys one may read this entry, dated September 25, 1660:

> I did send for a cup of tea, a China drink, of which I had never drunk before.

This novel drink grew so steadily in favor that by the close of the eighteenth century it was being consumed by the English at the rate of two pounds a year per person.

The tea industry began in British India under the auspices of the East Indian Company about 1834, but the Dutch preceded the English in this field, for experiments in tea culture were made in Java as early as 1826. The industry was put on a paying basis in Formosa about 1860, and in Ceylon in 1876. An enthusiast on the subject has paraphrased the Bible thus:

> Tea is better than wine, for it leadeth not into intoxication; it is better than water, for it doth not carry disease. B.M.W.

Consult Walsh's *Tea: Its History and Mystery.*

**TEACH'ING,** Motivation of. The motivation of teaching consists in planning and teaching the work of the school so that the tasks of the pupil are made significant and purposeful to each child by relating them as closely as possible to his childish experiences, questions, problems, desires and needs. The child's work is motivated whenever he sees a real use in it—whenever it satisfies some need he feels, provides some value he wants, supplies some control he wishes to possess, secures some desired end, or helps him to attain any definite goal.

The goal sought may be near or remote—as near as winning the prize in a spelling contest; as far as gaining the ability and skill to construct a box kite. So long as a child comprehends more or less clearly the relationship between the work he is doing and the end sought, his work is motivated. The more definitely he appreciates this relationship and the more keenly he desires to reach the given goal, the more impelling are his motives.

It has long been held that if the school would be successful in its work, the teacher

must be guided constantly in every detail of her work by a sensible, clear-cut, definite purpose. In recent years it has come to be perfectly evident that if the pupils' work is adequately motivated, they, too, must be working always under the guidance and inspiration of a definite, attainable purpose or goal. In other words, the activities and work of the school should be so planned by the teacher that questions of vital importance to the pupils are naturally asked by them as the work progresses. These questions reveal the problems confronting the pupils and the needs they feel. The next work of the school should then be so planned that the pupils find their needs supplied, their questions answered and their problems solved.

Under their teacher's leadership, the pupils of a school decided to remember the birthday of an elderly, poverty-stricken woman who lived all alone near the school. They not only wished to send her some flowers and a more enduring present, but likewise they planned to go to her home at the dinner hour on her birthday, taking with them food for a substantial dinner and spending the early portion of the evening with her, following the dinner with an appropriate little program of entertainment consisting mainly of a talk by one of the pupils presenting the present and of singing songs which they thought she would enjoy. For a number of days, the execution of this plan afforded the children very profitable work. In the arithmetic class, they estimated how much each child should earn in order that they might have enough money with which to buy the presents and meet the expenses of the dinner. In the composition class, they developed the talk which was to be made by the pupil presenting the presents. In the music classes, they selected and practiced the songs which they sang on the evening of the birthday party. Under the inspiration of carrying through successfully what they had decided to do, their school tasks which enabled them to accomplish their end were interesting and attractive. They worked not only with enthusiasm but with accuracy.

Any teacher who wishes to motivate the work of her pupils needs, in the first place, to be so familiar with the interests and tendencies which are natural to children that she is able to think in terms of their attitudes and wishes in planning her work. School work which is built upon one or more of the following tendencies or interests which are normal to children is rather certain to be well motivated.

(1) *Earning Money and Acquiring Property.* While this tendency in children needs to be used guardedly as the basis for school work, yet every experienced teacher knows that almost irrespective of a child's age or condition, difficult tasks become attractive if one result of his work is having some money or property of his own. As employed in school, this tendency is less dangerous if the commercial gain sought goes to a group or class rather than to a single pupil. Writing or other contests in which pupils have an opportunity to participate for commercial gain are many, and excellent results to the children follow from participating in these contests, but due care should be exercised to avoid the objectionable results which follow from too great use of prizes of value in stimulating effort in school work.

(2) *Competing for Results, a Reward or an Honor.* A pupil who is striving to attain any one of these ends through school work has a strong motive for effort. The instincts of ownership, ambition, emulation, rivalry, love of approbation and courage are all appealed to. The efforts put forth by pupils in spelling, oratorical, music and debating contests are largely the result of the native tendency in children to compete for results.

(3) *Playing Games.* Play is the dominant activity in childhood. Any work which may be done, or any result which may be accomplished through play or through taking part in a game, is strongly motivated. Any child willingly prepares and practices that he may do his part well in a game. He sees that his only right to take part with a group engaged in a game is ability to aid in winning the game. Modern education makes large use of the interest of children in such games as the relay race in spelling and numbers; bean bag in language, spelling and numbers; mail carrier and Santa Claus in beginning reading; baseball in spelling and numbers, and so on. A large variety of games are employed in language work in teaching polite usage and the correct use of idiomatic language. One reason dramatization, which is so much used in reading and language work, secures such good results is because of the game and play element involved.

(4) *Making Things.* The constructive instinct is strong in children of all ages. They like to manipulate materials and see what they can produce as a result. The small child works with its blocks to see what it can produce, while the child a little older may take paper and scissors, or a piece of wood and a jack-

knife. All of the constructive and manual training work in the schools is largely based upon this interest of children. It results in the children making simple birthday or Christmas or Valentine gifts for parents or other relatives. Often the children of an entire room or class unite to produce articles needed about the schoolroom or in the corridors of the building, such as a bookcase, a rug, a couch cover, curtains, a pedestal for a piece of statuary.

(5) *Entertaining.* Children enjoy entertaining. They like to have the pupils of another room visit them or to have their parents or other mature people come as their guests. The instincts of imitation, play, sociability, expression, ambition, rivalry, love of approbation, pride, and so on, find expression in entertaining. The wise teacher, recognizing this tendency in children, makes it the basis for securing good work in all of the subjects which are drawn upon when a program is developed to provide entertainment for the guests. Such programs will usually require music, story-telling, calisthenics, reading and dramatization. The motive of entertaining well through these means supplies the impelling power which is necessary to good work in these subjects.

(6) *Sharing.* The activity of sharing is very similar to that of entertaining, and is based upon the same instinctive tendency. Just as the adult wishes to share with his friends the results of his labors, be they fragrant roses, a model dairy, or an exquisite painting, so children wish to share the products of their labors. Hard work becomes a delight when there is a prospect ahead of sharing with others the results of their efforts.

Good schools plan to give the children large opportunities for sharing with each other. Any interesting experience enjoyed by a group of children is shared with others who might enjoy it and profit by it. They might write it up and send it to different rooms or send children to talk about it in the different rooms. The school assembly, in which the entire school meets, is an excellent plan for sharing with all the best any room produces.

(7) *Advancing Self in the Estimation of Others.* Children, as well as older people, are anxious to be highly esteemed by others. What person is not happy in a task regardless of its difficulty, if he sees that it will enable him to rise worthily in the esteem of others for whose good opinion he cares? Pupils strive hard for good grades, that the teacher may think well of them, that they may merit the esteem of their classmates and that they may please their parents and others who care about their progress.

(8) *Promoting Self-development.* This motive appeals more strongly with advancing years. It leads the student to undertake tasks involving long periods of effort, sometimes months or even years. It impels the student of science to undertake difficult and extended investigations, to assume great risks and to endure great privation. Success is assured when this motive becomes dominant.

Under the influence of this motive students are found not only meeting the requirements of the teacher in the preparation of lessons, but visiting scientific and historical collections and going to other sources of help outside of the school, such as to the city, college, or state library. Such students also insist upon solving their difficult problems and performing their science experiments unaided.

(9) *Preserving Products and Collections.* This motive has a strong basis in the instincts of collecting, ownership, preservation. Children collect and preserve beautiful stones, postage stamps, pictures, postal cards, playthings, and so on. Older persons preserve letters, gifts, heirlooms or scientific collections. This motive may be invoked in getting pupils to keep well-organized outlines and complete notebooks.

(10) *Mastering and Conquering.* The instinct to subordinate and control both matter and persons is one of the most imperious of man's tendencies. It asserts itself in infancy in the child's desire to know, to understand and to rule or to lead in his group. It grows in strength with succeeding successes and is checked only when ambition is crushed. The presence of this tendency in children is the school's greatest hope of getting the pupils to do their work. The school should train children to solve problems and to meet difficulties unfalteringly.

(11) *Fitting for a Life Career.* While not functional in early childhood, the goal of preparing for a successful life career becomes a strong motive quite early with ambitious children. Under the stimulus of this motive, programs of work and hard tasks extending over a series of years are undertaken with enthusiasm and determination. An appeal to the child's desire for future success is seldom devoid of results and is most often met with a hearty response and a renewed will to work. H.B.W.

For other phases of the subject, consult the list of Related Subjects at the end of the article EDUCATION, pages 1954-1955.

**TEAK,** *teek,* a beautiful forest tree of the verbena family, native to Southeastern Asia. It is the source of a wood highly valued for shipbuilding and for furniture making. The special qualities of teakwood are strength, durability and resistance to water; in addition, it is easily worked, takes a high polish, and contains a resinous oil that makes it resistant to insects. In appearance the wood resembles coarse mahogany. Teak trees sometimes grow to be 200 feet in height, and are generally found in groups in forests of other trees. The leaves, which are often two feet long and a foot and a half in width, yield a purple dye. In India the British government controls most of the teak supply and derives therefrom a profitable income. Bangkok, in Siam, and the Indian cities of Rangoon and Moulmein are centers of export.

A tree known as *African teak* or *African oak,* belonging to the spurge family, is also valued for its wood, which is used for about the same purposes as the Asiatic teakwood. The African wood, however, is the less durable.

**TEASEL,** *te'z'l,* a genus of plants containing one commercially valuable species, the *fuller's* or *clothier's* teasel. This plant, which is

TEASEL

native to the south of Europe and has been naturalized in America, is used to raise the nap on cloth. The parts employed for this purpose are the heads of the tubular pale lilac or white flowers. These heads are cut in two and attached to a cylinder which is made to revolve against the cloth. The largest heads are used for raising the nap on blankets; the next size, for raising that on cloth for men's garments. Small, immature ones are used for fine woolens and broadcloth. Strange to say, no mechanical device has ever been invented which satisfactorily fills the place of this plant. It is a thistlelike herb with long, stemless leaves, prickly stems, and stiff, sharp bracts surrounding the flower heads.

**TECHNICAL,** *tek'ni kal,* **AND INDUSTRIAL EDUCATION.** The modern trend toward the practical in education is seen in the establishment of vocational courses in the public schools and in the successful operation of numerous institutions which prepare young people to earn their livelihood. Technical and industrial education is a general term covering the various forms of instruction having this end in view. Such instruction is carried on in technical high schools, in manual training classes and in trade schools, and is continued in schools of applied science and technology of college rank. Among immature students mistakes are often made because these inexperienced young people do not always know for what vocations they are best fitted. What is being done to direct such students, and to help them choose vocations in which they will be successful, is told in these volumes under the heading VOCATIONAL GUIDANCE.

The reader is also referred to the article SCHOOL, subheads *Vocational Schools, Technical Schools* and *Trade Schools,* and to the allied subjects listed at the end of the article EDUCATION.

**TECK,** *tek,* ALEXANDER AUGUSTUS FREDERICK, Prince of (1874- ), an English army officer who was officially announced Governor-General of Canada on May 7, 1914, to succeed the Duke of Connaught, but was unable to assume office on account of the outbreak of the War of the Nations. He was ordered to the front, and in November, 1914, distinguished himself for valorous service and was promoted to the rank of colonel. His Highness is the brother of Queen Mary and the great-grandson of George III through his mother. In 1904 he married Princess Alice of Albany, granddaughter of Queen Victoria. He received his education at Eton and Sandhurst, served in the Matabeleland war in 1896, and for bravery in the South African War was given the Queen's medal, and appointed a member of the Distinguished Service Order.

**TECUMSEH,** *te kum'sch* (about 1775-1813), an American Indian chief, born near the site of the present city of Springfield, Ohio. He was of Shawnee and Creek stock, and seems to have been able to talk both dialects with ease. When he was about thirty-five years of age he and his brother, Tenskwatawa, known as "the Prophet," formed a great union or confederacy of Indian tribes, and about 1810 Tecumseh made a long trip through the Present Southern States to persuade the Creeks, Seminoles and other tribes to join in the plan. He was a powerful orator, and his speeches during this journey are believed to have caused the Creek War of 1813.

While he was absent his own tribe was badly defeated by General William Henry Harrison in November, 1811, at the Battle of Tippecanoe, in Indiana; during the next year the chief was appointed brigadier-general in the British army, and he rendered valuable service against the Americans in the War of 1812. Some historians have stated that the United States would have gained Canada had it not been for Tecumseh's alliance with the British. He was killed in the Battle of the Thames River in Ontario, Canada. Tecumseh was a believer in the primitive virtues of the red man; he prohibited the use of intoxicants among his tribe and did much to lead his followers back to the simple ways of their forefathers.

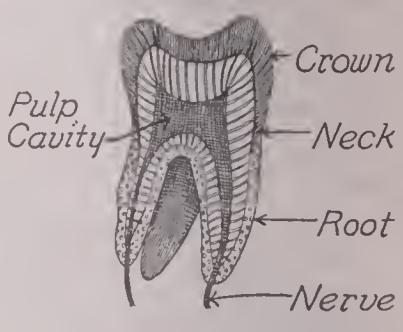
**Related Subjects.** The reader may consult, for explanation of references and for further information, the following articles in these volumes:

Creeks
Harrison, William Henry
Shawnee
Thames River, Battle of the
Tippecanoe, Battle of

**TE DEUM,** *te de'um,* a famous Latin hymn, so called from the opening words, *Te Deum Laudamus* ("We praise Thee, oh Lord"). Though one of the most solemn and majestic church songs ever written, it is also one of the simplest, and its words have inspired many composers to set them to appropriate music. The *Te Deum* is sung in Roman Catholic churches on occasions of rejoicing and thanksgiving, and it is found in the *Breviary* (which see) and in the Anglican prayer book. The authorship is unknown, but is ascribed by tradition to Saint Augustine and Saint Ambrose.

**TEETH.** Like the hair and nails, the teeth are an outgrowth of the skin, the growth in this case taking the form of hard, shiny projections specially adapted for the work of cutting and tearing food and of grinding it to a pulp (see MASTICATION). Man and most of the higher animals have two sets of teeth, a temporary and a permanent set. In the case of human beings the first, or *milk,* set usually develops between the sixth and thirtieth months, and when the child is two and one-half years old it has twenty teeth. At the age of five the first of the permanent set begin to appear, but the last of these sometimes do not break through until the twenty-fifth year.

**Names and Structure.** There are thirty-two teeth in the permanent set of an adult, eight in each half of each jaw. In each half there are two incisors, one *canine* (called the *eyetooth* in the upper jaw, because it is just below the center of the eye), two *bicuspids* and three *molars.* Because the last of the molars develop between the seventeenth and twenty-fifth years they are called the wisdom teeth. The bicuspids take the place of the temporary molars, but all of the permanent molars, twelve in number, are entirely new teeth.

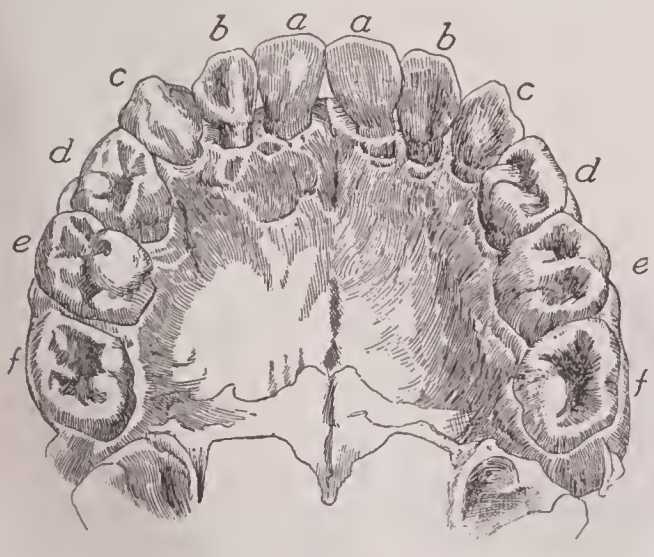


LONGITUDINAL SECTION OF A TOOTH

Each tooth has three parts—the *crown,* that part seen in the mouth; the *root,* the part embedded in the jawbone; and the *neck,* or *cervix,* a narrowed portion between the crown and root. The jaw is furnished with sockets called *alveoli,* into which the teeth fit. The various kinds of teeth differ considerably in regard to the shape of the crown. That of an incisor is shaped something like a chisel, with sharp, horizontal cutting edges, for the incisors are used to bite or gnaw off the food. The canines *(dogteeth)* have thicker crowns, shaped somewhat like a cone, with a central point on the cutting edge. In the case of dogs and cats the canines are very long and pointed, for with them these creatures grasp and hold their prey. The bicuspids are not so long as the canines and are somewhat cube shaped. Each has an inner and an outer point, or *cusp,* on the cutting edge. Hence the name, which means *two-cusped.* The molars, or grinders *(mill teeth),* are provided with large crowns roughened in such a way as to adapt them to crushing and grinding the food. The molars of the upper jaw have three roots; those in the lower have two.

During the life of a tooth a soft pulp, containing nerves and blood vessels, fills a cavity known as the *root canal,* which extends through crown and root. Immediately surrounding the cavity, and making up the greater part of the bulk of the tooth, is a hard, bony, yet elastic, substance called *dentine.* This is covered on the crown with *enamel,* a tissue so hard that it will strike fire with flint. The root of the tooth is fixed in place by a thin layer of bone known as *cementum,* and at its tip is a narrow aperture through which the blood vessels and nerves of the pulp cavity enter. Exposure to the air of these delicate nerves, through decay of the outer parts of the tooth, is responsible for the agonies of toothache.

**Care of the Teeth.** Because the inside of the mouth is always moist and warm it is a very favorable breeding place for germs of all kinds. A neglected mouth may harbor organisms that cause diphtheria, pneumonia and other infectious diseases. Furthermore, accumulations of food particles, collecting in the spaces between the teeth, at the margin of the gums and elsewhere, encourage the multiplication of countless bacteria which form acids on exposed surfaces of the teeth. These acids eat into the protecting enamel, and if no steps are taken to prevent further harm, ultimately cause the teeth to decay. For these reasons the mouth

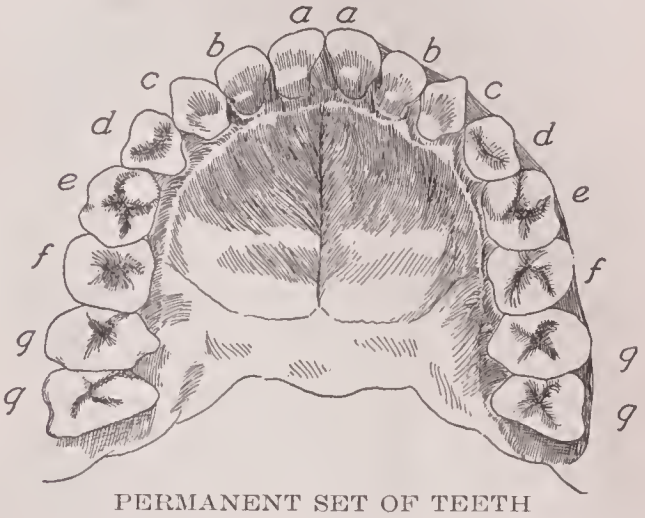



FIRST SET OF TEETH

(*a*) Central incisors; (*b*) lateral incisors; (*c*) cuspids; (*d, e*) temporary molars; (*f*) sixth-year molars.

and teeth should be scrupulously cared for from infancy to the end of life. Parents who think the temporary teeth need no attention are badly in error. The first teeth of the small infant should be cleaned at least twice a day with a soft brush, and just as soon as the child is old enough to handle a brush he should be taught to perform this hygienic act for himself. Neglected teeth in the mouth of a little child are a source of physical pain and a detriment to thorough chewing and to the general health, and they have an adverse effect on the teeth which come later.

Not only should the teeth be thoroughly scrubbed, but the gums and back of the tongue




PERMANENT SET OF TEETH

(*a*) Central incisors; (*b*) lateral incisors; (*c*) cuspids; (*d, e*) bicuspids; (*f*) sixth-year molars; (*g*) molars.

also need daily cleansing. In addition to a good, moderately-stiff brush one should have in the toilet equipment a reliable tooth paste or powder and an antiseptic mouth wash. Advice on these matters is always cheerfully furnished by the family dentist, who should be visited at least twice a year by each member of the family. The custom of brushing the teeth sidewise has fallen into disfavor, as this method lacks thoroughness. Instead, the brush should be placed upon the gum and be manipulated with a rotary movement upward on the lower teeth and downward on the upper. The teeth should be cleaned on the inside and out, and back to the last molars, and the mouth be rinsed by forcing water between the teeth. In addition, after each meal (but away from the table) the crevices of the teeth should be cleaned with a quill toothpick and dental floss. If possible, a brushing should be given after each meal, but under no circumstances should one omit it at night before retiring. If such precautions are taken, and the teeth are cleaned and examined twice a year by a reliable dentist, decay of these important organs can usually be prevented, or at least materially checked.

Aside from neglect of the mouth, unhygienic habits of eating may affect the teeth. The custom of bolting the food, or of including too great a proportion of soft and partly-digested foods in the diet, interferes with that vigorous

exercise of chewing so essential to the health of the teeth. The diet should be one that requires considerable mastication, and it may well include such acid fruits as apples, oranges and grapefruit, all of which tend to keep the teeth clean. Another deplorable habit is that of breathing through the mouth, which causes dry, unhealthy gums. This is often due to enlarged tonsils or adenoids (which see), and mothers and teachers everywhere should be on the watch to detect these conditions. It should be borne in mind that bad teeth are often a cause of disease elsewhere in the body, for cavities due to decay mean a possible source of infection.

**Pyorrhoea** is one of the most serious diseases of the teeth. Its scientific name, *pyorrhoea alveolaris,* more accurately suggests its character, as it is a disease of the alveoli, or sockets. It begins beneath the edges of the gums, where there has been an accumulation of lime deposits, or tartar, and as the infection progresses it gradually destroys the membranes that attach the root of the tooth to the bony socket. As a result, the teeth slowly loosen and cannot be used effectively in mastication. If the infection is not checked the teeth must eventually be extracted.

This, however, is not the only evil effect. Pus is formed in the pyorrhoea pockets caused by the broken-down tissue, and is constantly discharged into the mouth and swallowed. As a result, bacteria are forced into the circulation and carried to remote parts of the body. Diseases of the heart, kidneys and other organs, as well as many minor ills, are sometimes directly traceable to infection of the teeth, and for this reason diligent care of the mouth is imperative. The preventive measures outlined above in the subhead *Care of the Teeth* have a direct bearing on this subject. In case of the establishment of the infection the patient should at once be placed in the care of a reliable dentist, that the disease may receive proper treatment. W.F.L.

**Related Subjects.** The following articles in these volumes may be consulted in connection with the study of the teeth:

| | |
|---|---|
| Dentistry | Health Habits |
| Digestion | Mastication |
| Fletcherizing | Mouth |

**TEG'NÉR,** Esaias (1782-1846), a Swedish poet, born at Kyrkerud. He was educated in the schools of his native town and at the University of Lund, Sweden, where he was a tutor and a Greek lecturer from 1802 to 1810; later he was chosen as professor of Greek and remained in this work until his appointment as bishop of Vexiö in 1824. His first success as a poet came in 1808, when he wrote a war song notable for its vigor. Three years later he wrote the patriotic ode *Svea,* which stirred all Sweden, and for which he was crowned by the Swedish Academy. During this same year he founded the Gothic League of Sweden, established for promoting the study of old Scandinavian history and literature, and to its magazine he contributed some of his best critical discussions and verses.

In 1817 he wrote his famous *Song to the Sun,* and the outside world began to discuss him. Later appeared his three masterpieces, the romance *Axel;* the delicate idyll, or pen picture, entitled *The First Communion,* translated in later years by Longfellow; and the poem which Goethe called "the old, mighty, gigantic, barbaric epic," *The Story of Frithjof.* This latter tale, based upon the ancient legends of Northern Europe, is by far the best known of all Swedish writings, and is said to have been translated twenty times into German and twenty-two times into English. About the date this poem was finished Tegnér fell madly in love with the wife of a Lund official, and for the next fifteen years this passion preyed upon his mind until in 1840 he became insane. Within a year he was pronounced cured, but in 1843 apoplexy seemed to renew the malady, and he did no more work of importance. He wrote a large number of beautiful songs, but his fame rests on *The Story of Frithjof.*

**TEGUCIGALPA,** *ta goo se gahl' pah,* the capital and largest city of the republic of Honduras, in Central America. It is situated on a plain surrounded by mountains, on the Choluteca River, about seventy-eight miles from the Gulf of Fonseca, an arm of the Pacific. It is the center of a fertile agricultural district, the most densely populated in the republic. The most imposing building in the city is the cathedral. There are located here a central university with departments of law, medicine, science and political sciences, a military school and a Central Institute for secondary work. A fine ten-arched bridge spans the river and joins Tegucigalpa with its chief suburb, Concepcion. One of the attractive features of the place is a central park containing a statue of one of the chief statesmen of Honduras. Population in 1914, 28,950.

**TEHERAN,** *teh' rahn',* the metropolis and capital city of Persia, is situated at the base of

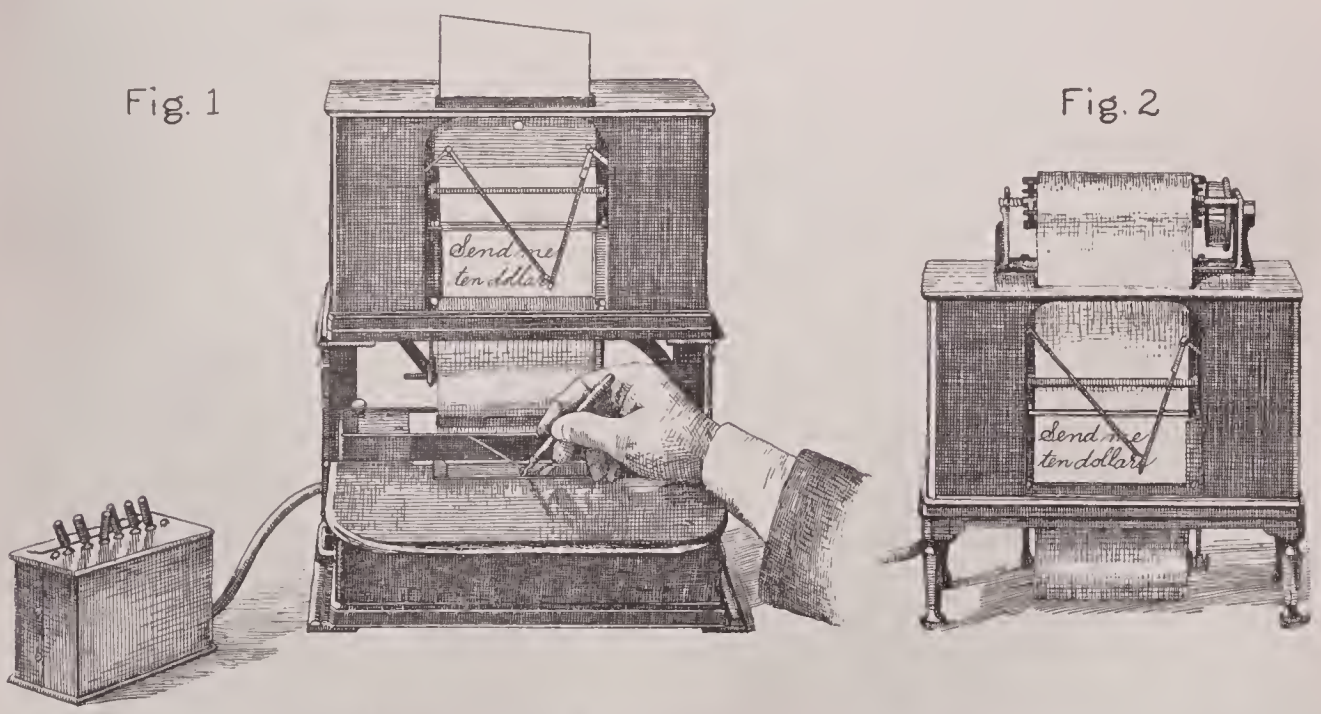
a snow-clad peak of the Elburz Mountains, about seventy miles south of the Caspian Sea and 210 miles north of Ispahan (see map of Asia, opposite page 417). Though it has developed as a typical Oriental city, with narrow streets and low, flat-roofed dwelling houses (see picture, page 4594), Teheran is gradually acquiring modern improvements.

The city lies in a region made productive by water conducted from the mountains through underground canals. These canals also provide the inhabitants with their water supply. Caravans bring their merchandise to this market, and the people carry on in a modest way the manufacture of cotton, linen, carpets, ironwork, hats and shoes. There are tramways within the place, and a local railway line extends from Teheran to a suburb six miles distant. There is connection also with Resht, 217 miles away on the Caspian Sea, by a good carriage road. Harun-al-Rashid (which see), of *Arabian Nights* fame, was born in the vicinity of Teheran. In the summer unpleasant climatic conditions drive the wealthier residents to the mountains. In the winter there are more than 280,000 inhabitants in the city, of whom about 600 are Europeans.

**TEHUANTEPEC,** *ta wahn ta pek',* ISTHMUS or, the narrowest portion of the American continent north of Costa Rica. It comprises that part of Mexico lying between the Gulf of Campeche, an arm of the Gulf of Mexico, and the Gulf of Tehuantepec, a part of the Pacific, and includes the southeastern parts of the states of Vera Cruz and Oaxaca and small districts of Chiapas and Lobasco. The isthmus is 120 miles across at its narrowest point; its mountains are broad and low, and since the days of Cortez it has been considered a favorable route for an interoceanic canal or railway. In 1907 a railroad 150 miles long, joining Coatzacoalcos on the Atlantic and Salina Cruz on the Pacific, was opened for traffic. It is operated jointly by the Mexican government and the constructing company, an English firm.

**TELAUTOGRAPH,** *tel aw' ton graf,* an instrument for transmitting writing by electricity. A *facsimile* of what is written or drawn on the transmitter is instantaneously reproduced and recorded by receiving instruments at one or more stations, each of which is connected to the transmitting station by two lines of wire carrying an electric current.

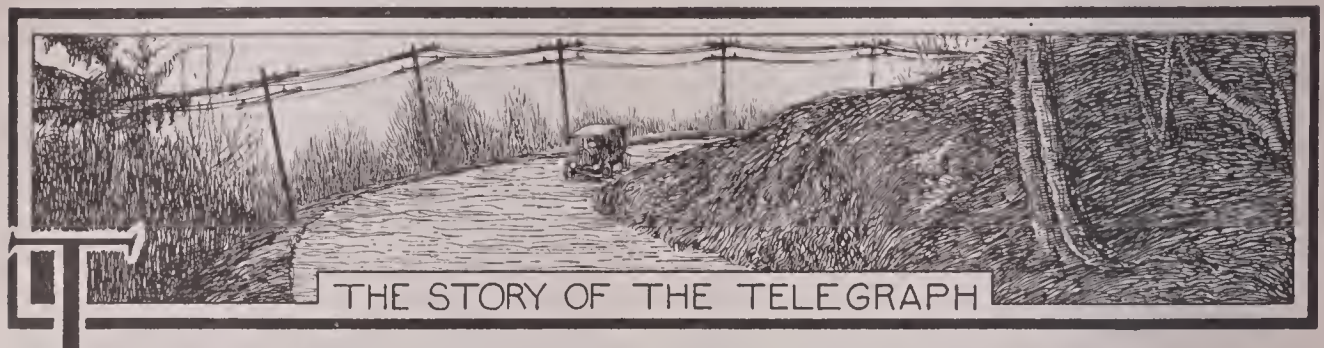
The machine is about as wide as an ordinary typewriter and somewhat taller. It is placed on a desk or table in a position convenient for the hand. The metal writing stylus resembles an ordinary lead pencil, and has two silk cords attached near the point and connected with the transmitter. By its movements over the metal plate, the stylus sends varying currents through these cords and over the line wires connected with other stations, which electrically operate the distant receiving pens. These pens reproduce the same motions, thus duplicating the writing. The receiving pen is a modification of an ordinary draughting pen, and is moved by supporting arms connected with the live wires. When not in use the pen rests with its point




HOW HANDWRITING IS TRANSMITTED BY ELECTRICITY
Fig. 1 shows the transmitting, or sending, station; Fig. 2 is the receiving station.

in an ink bottle fixed at the side of the plate over which the recording paper passes.

The telautograph is one of the most useful and accurate of all efficiency machines. It transmits a message with speed and exactness and is invaluable for recording and comparing signatures in banks. It is extensively used in hotels, department stores and other large business establishments to send messages to various rooms or departments, and is very useful in noisy places where the use of the telephone is difficult. This instrument is also utilized for writing messages on bulletin boards, visible to large crowds of people, such as gather on election days when political feeling runs high. It was invented by Elisha Gray.



## THE STORY OF THE TELEGRAPH

**TELEGRAPH,** *tel'e graf,* a device for sending messages to a distant place by means of signals which represent words or ideas, as distinguished from the telephone, in which spoken words are reproduced at a distance. The word *telegraph* means *to write afar off.* The electromagnetic telegraph has displaced all other forms, hence the word is now understood to mean a device in which electricity is used in the transmission of signals to a distance. The electric telegraph ranks as one of the greatest civilizing agencies the world has ever known. It has revolutionized the means of communication. It has brought widely-separated nations into the relationship of near neighbors, making them acquainted rapidly with all the arts of peace and as thoroughly serving them in the business of war.

**The Speed of Telegraphy.** "As quick as a wink" is a homely phrase for instant action, but no human effort can match the telegraph for instantaneous effects. A telegraph operator presses his key in New York City; when his instrument clicks in response to that pressure a sounder at the other end of the line in San Francisco will at almost the same indivisible fraction of a second respond to the impulse that has traveled the breadth of a great continent. When Queen Victoria died papers announcing her death were selling on the streets of American cities thirty minutes after the event and before the slower English editors had printed the same information. The result of a horse race in Havana is known to thousands of sportsmen in all sections of America before the winning horse is led off the track. In early colonial days a Bostonian wishing to get word to a man in New York might be able to journey back and forth in possibly twenty days. To-day he can call a messenger boy electrically, send a telegram, and, barring human delays, get an answer in about as many minutes, at a cost of a few cents. At daylight on a morning in July, 1917, the English exploded a dozen mines at Messines, Northern Belgium, which they had planted under the Germans. Before daylight across the western sea papers containing the news were being delivered to their readers.

Such facts as these proclaim the marvel of the telegraph. Because of it "a girdle can be put around the world" in a few minutes, and the news of feast or famine, coronation or death in India becomes a theme for congratulation or sympathy in an hour in the Western world. A telegram has reached Sydney, Australia, from New York City by direct wire in three seconds —an electrical impulse pushed through twelve thousand miles of resisting wire, over mountains and under oceans, in about the time you need to walk twelve feet.

**Development.** The first message over the telegraph wire, between Washington and Baltimore, in 1844, was "What hath God wrought?" The marvel of that crude, first instrument suggested powers almost supernatural, yet man has taken these physical forces which he understands yet only in part and has employed them to carry his message to the uttermost parts of the earth.

To accomplish this he has demanded almost 6,500,000 miles of wire for his telegraph and submarine cables—enough wire to stretch 260 times around the world. Of the land lines the

United States possesses about 1,500,000 miles of wire, or twenty-five per cent of the lines of the world; Canada has 135,000 miles. The total land telegraph investment of the world, including wires, offices and all equipment, is $700,000,000; the cable systems cost $350,000,000. There is, therefore, over a billion dollars applied to an invention which was unknown within the memory of men yet living and which is yet a novelty in many thickly-settled countries. E.D.F.

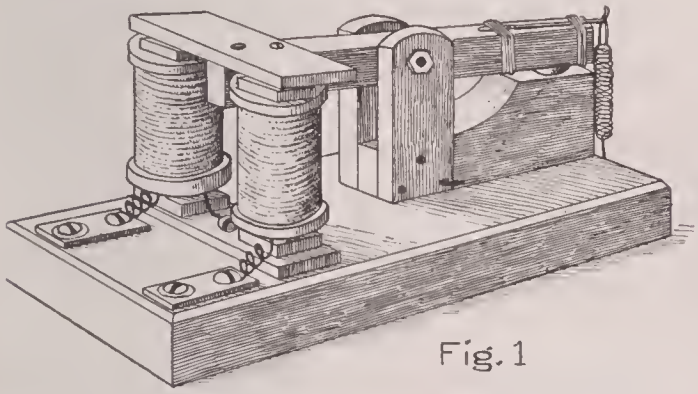
## *The Making of the Telegraph*

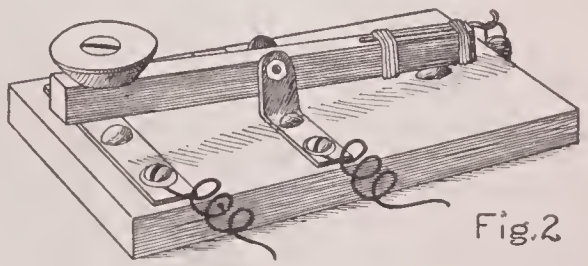
**Telegraph and Doorbell Compared.** An electric doorbell circuit is similar to a telegraph circuit. When a caller arrives at the door he telegraphs the fact of his arrival by means of the electric bell. The bell corresponds to the telegraph sounder. The push button at the door corresponds to the telegraph key. If two wires are connected to an electric battery and to an electric bell, the bell rings because the current from the battery flows through the coils of the electromagnet which is part of the bell. If one of the wires is cut and the ends are separated, the bell ceases to ring because the circuit is open and the current cannot flow. If the ends of the cut wire are pressed together the bell again rings.

It would be inconvenient to press the ends of two wires together every time one wished to ring the bell, so a push button is used, the end of one wire being connected to a spring and the end of the other to a second spring under the first. When the button is pressed the two springs are pressed together and this is the same as pressing the ends of the wires together. Pressing the button causes the bell to ring, because this closes the circuit and permits the current from the battery to flow through the bell. See ELECTRIC BELL, page 1983.

In the telegraph, pressing the key closes the circuit and permits a current to flow through the electromagnet coils of the sounder. The electromagnet then pulls a piece of iron called an *armature;* it pulls only when a current is flowing through the coils of the magnet. When the key at the sending station is pressed down, it makes an electrical contact which closes the circuit and permits a current to flow through the electromagnet coils of the receiving instrument. The electromagnet then attracts the iron armature, pulling it down, and with it the brass arm of the sounder. This causes a click. When the key is released the circuit is broken, the current ceases in the electromagnet, the sounder arm is released, and the spring pulls it up, causing a second click.

**A Simple Telegraph.** Two boys can easily set up a telegraph line between their homes. Two sounders, two keys, and one electric battery, which may consist of two or three dry cells, which may be purchased for a slight sum, are needed. The magnet of an old electric bell can be used in making the sounder, or an electromagnet can be made, as follows:

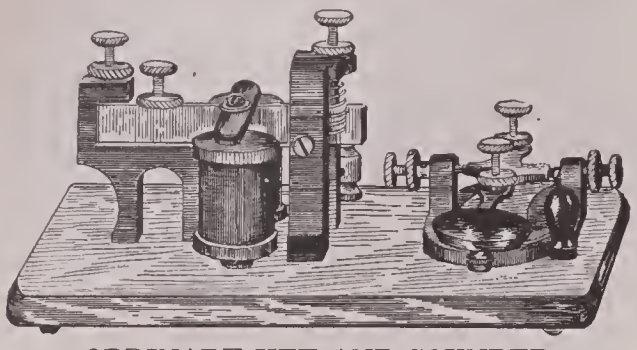



A BOY CAN MAKE A SIMPLE SOUNDER AND KEY

With a hack saw or a file cut off two pieces of soft iron rod, each about an inch and a half long, and file the ends smooth. Cut out two round disks of hard fiber or stiff cardboard and fit them to the ends of the iron rods so as to form spools. Wind about fifty turns of magnet wire on each rod, winding the two coils in the same direction. The two coils are to stand upright on the base of the instrument and to rest on a strip of iron. It is better if the strip of iron can be fastened to the rods with machine screws, but this is not necessary. Connect the coils so that when connected to a battery the upper end of one rod is a north pole and the upper end of the other is a south pole. The polarity can be tested by means of a pocket compass. Another strip of iron is used for the

armature of the magnet. This armature is fastened to an arm of brass or wood. The arm is pivoted and held up by a rubber band or a spring made of brass or steel wire. The sounder then appears as in Fig. 1. A key for opening and closing the circuit can be made of a piece of spring brass or spring steel, or an ordinary bell push button can be used. The key will then appear about as in Fig. 2. Only one line wire is needed. For the ground connec-



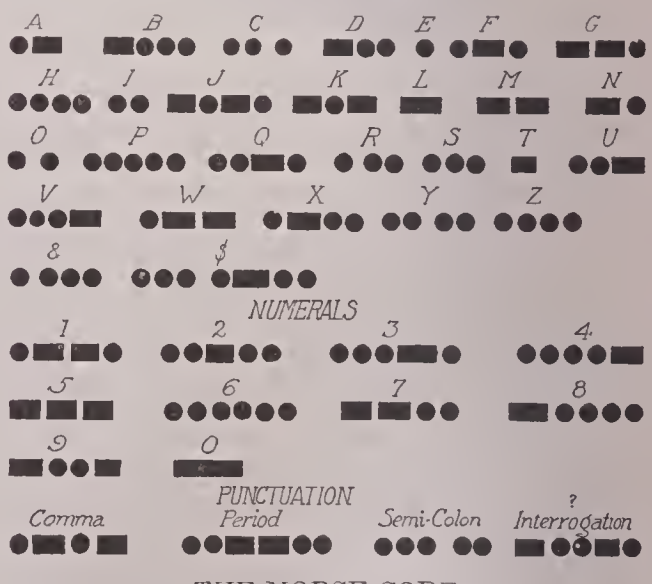
ORDINARY KEY AND SOUNDER

tions connect the wires to gas or water pipes. A key and sounder similar to that shown in the above illustration may be purchased for less than five dollars.

**The Ground.** Connecting the ends of the line to the earth makes it possible to use only one wire, the earth taking the place of the return wire. We may think of the earth as a great reservoir of electricity. An electric charge which goes along the line into the earth does not return to the other end of the line, but another charge goes from the earth into the line. We may compare such a current to a current of water in a pipe laid along the shore of a lake. Water is pumped in at one end of the pipe, and it flows out at the other end into the lake. The water which flows out of the pipe into the lake does not return to the other end of the pipe, nevertheless the lake furnishes a supply of water so that the current flows as long as the pump continues to work. In a similar way the electric current in a single wire telegraph line continues to flow as long as the battery or dynamo continues to work.

**The Relay.** For long-distance work the current from a battery, or even from a dynamo, is too feeble to operate the sounder. This is true because of the resistance a long line wire offers to the passage of the electric current. The practical limit of the single telegraph line in fair weather is about 450 miles; in rainy weather the limit is from 150 to 250 miles. However, messages are sent in all kinds of weather over distances of thousands of miles. This is accomplished by means of a *relay*. A relay is a contact key which is operated by means of an electromagnet. It is operated in the same way as a sounder. Suppose that when the armature of a sounder is pulled down by the magnet it brings two contacts together and closes another circuit. The sounder would then be a relay. The circuit which is closed by the relay may be hundreds of miles long or it may be only a few feet. A relay used in this manner to send a message on to a more distant station is called a *repeater*. At the farther end of the second line there may be a second relay which closes a third circuit. A message may be sent to any desired distance by using a sufficient number of relays.

**The Codes.** There are two codes in general use, the Morse and the Continental. The Morse code is used in the United States and Canada, and the Continental code has been adopted in all other countries. For communication by cable between the United States and other nations the Continental code is used. The signals of the Continental code consist of dots and dashes; those of the Morse code consist of dots, dashes and spaces. The letters which occur most frequently have the simplest symbols; for example, the letter *e* is represented by one dot and the letter *t* by one dash in both systems. A dot is made by quickly pressing and releasing the key, producing a rapid *click-clack* sound in the receiver. A short dash is twice as long




THE MORSE CODE

Dots, dashes and spaces are employed to form the letters.

as a dot. A long dash, as for the letter *l*, is equal to four dots. The space between the dots and dashes that make up a letter is equal in length to the dot. The space between the letters of a word is equal to three dots and the space between words to six dots. A space which

is part of a letter combination is equal to two dots.

**Sending Four Messages at One Time over One Wire.** One of the marvelous achievements in telegraphy is that of sending a number of messages at one time over one wire. One electric current can be made to convey four messages

THE CONTINENTAL CODE

Dots and dashes are employed to form the letters. Spaces are used only to indicate the end of one letter and the beginning of the next.

at one time, two going in one direction and two in the opposite direction, and the messages do not interfere with each other. To send two messages at one time in opposite directions the instruments must be so arranged that the sounder is in the circuit but is not affected by the sending instrument at the same station.

A telegraph system by means of which two messages can be sent at one time is called a *duplex system*. In the duplex system the making and breaking of the circuit operates the sounder, regardless of the direction in which the current flows. In another system of duplex telegraphy it is by changes in the direction of the current that the signal is transmitted. When these two systems are combined in one wire a single current will transmit four messages at one time, developing a *quadruplex,* or fourfold, system. We may think of the fourfold system as working in the following manner:

There are two receivers and two sending instruments at each end of the line, all connected to one line wire. They are so arranged that the outgoing messages from station 1 do not affect the receiving instruments at station 1. Messages sent from station 1 affect only the sounders at station 2. A constant current is flowing in the line, but the receiving instruments are so arranged that none of them is moved by this current unless a change is made either in the direction or the strength of the current. If the direction of the current is changed at station 1, one sounder at station 2 responds with a click, but the other sounder at station 2 is not affected. If the strength of the current is changed at station 1 the second sounder at station 2 responds. Thus two signals are sent at the same time from station 1 to station 2. In the same way and at the same time two signals may be sent from station 2 to station 1.

Every telegraph line of importance is at least arranged for duplex telegraphy and many are quadruplexed.

**Use of the Dynamo.** For long-distance telegraphy dynamos are used to supply current to the line. They occupy less space and are more economical than batteries. A generating plant sufficient to operate a thousand lines may be installed in a small room. The lines may vary in length from fifty to 500 miles.

**Batteries.** When batteries are used for long-distance work, storage cells are always used. The gravity, or Daniell, cell is used for local circuits only, and even for local circuits storage cells are frequently used.

**Telegraphing without Wires.** See Wireless Telegraph.

**Submarine Telegraph.** See Cable, Submarine.

**Printing Telegraph.** The printing telegraph delivers the message in printed form on a tape or in typewritten pages. The operator need not know the Morse code. He operates a typewriter keyboard as if he were typewriting a letter. In some forms of printing telegraph a special form of typewriter receives the message. Each key of the receiving typewriter is controlled by a small electromagnet. Each of these electromagnets has its own combination of electric impulses to which it responds and which is sent over the line when the corresponding key is depressed at the sending end. Four messages, two in each direction, may be sent at one time over the line by the printing telegraph. The *stock ticker* is a form of printing telegraph in which the messages are printed on a tape. It is used in telegraphing market quotations.

**High-Speed Telegraphy.** An automatic device for operating the electrical contacts makes

it possible to send one thousand or more words per minute. The message is prepared on a tape somewhat after the manner of the music roll of a piano player. This tape is run through the sending instrument by clockwork and operates the contacts. An automatic receiver records the message, which may be preserved and read at leisure. E.E.B.

## *Historical Sketch*

A telegraph consisting of a system of semaphore signals was used in the latter part of the eighteenth century. France had the most extensive system of this kind, connecting Paris with all the principal cities of the country, a semaphore every three miles. The device in those days was considered wonderful.

Benjamin Franklin was the first to conceive the idea of telegraphing by means of electricity and to leave a record of his experiments. He tried the experiment with four miles of wire, but the electric battery was then unknown, and the discharge from an electrical machine or a Leyden jar could not be used for a practical telegraph. The invention of the electric battery in the last year of the eighteenth century revived the idea of an electric telegraph. Every known means of producing an electric current or a static electric charge, and every known effect of an electric current up to the time of Morse's invention, had been used in attempts to invent a telegraph. No success was possible, however, until the electromagnet had been discovered and perfected.

The discovery of Oersted that an electric current flowing along a wire will cause a compass needle to turn when the wire is held in a certain position over the needle led to the invention of the needle telegraph. In the needle telegraph the receiver was simply a magnetic compass placed in a coil of wire. When the circuit was closed at the sending end the needle moved; the movements of the needle indicated the letters of the alphabet. A number of needle telegraphs were invented, and some of them were used commercially. The Cooke and Wheatstone needle telegraph was employed in England as late as the year 1870, but it was not successful over long distances.

The device that made long-distance telegraphy possible is due to Joseph Henry, whose discovery consisted of a means of increasing the strength of an electromagnet by winding many turns of insulated wire upon the coil so that even a feeble current would produce considerable magnetic strength. Samuel F. B. Morse made use of the discovery of Henry and devised a practical system which was the beginning of the modern telegraph.

Morse had difficulty in convincing men of the value of his invention. Private investors would not give him a hearing, and he despaired until finally the United States government appropriated $30,000 for a test. A line was built from Washington to Baltimore, but even the Congressmen who voted the money for the experiment ridiculed the inventor and his device. The first words sent over this line, quoted above, were suggested by a young lady who was present at the experiment.

The Democratic national convention was then in session at Baltimore. A Senator named Wright was nominated for Vice-President the following day; the news was telegraphed to Washington and Morse advised the nominee of the honor. He said, "Tell them that I refuse the nomination." Not realizing that a new force had been demonstrated to the world and failing to see how the declination could have come so quickly from Washington, the friends of the nominee believed the story to be an invention of the opposition. They accordingly sent a delegation to visit him, and there learned the means by which his refusal had reached Baltimore. On the following day James K. Polk was named for President of the United States, and the fact was published briefly in a Washington paper under the heading "Telegraphic News." This was the first incident of the kind in the world's history. E.E.B.

Consult Edison's *Telegraphy Self-Taught;* Jones' *Telegraphy for Beginners;* Sewell's *Lessons in Telegraphy;* Houston and Kennedy's *Electric Telegraph.*

**Related Subjects.** The reader will find interesting supplementary matter about telegraphy in the following articles in these volumes:

| | |
|---|---|
| Cable, Submarine | Morse, Samuel F. B. |
| Dynamo | Telephone |
| Electricity | Wireless Telegraph |

**TELEGRAPH,** WIRELESS. See WIRELESS TELEGRAPH.

**TELEPATHY,** *te lep' a thi,* the influencing of one mind by another at a distance without the use of ordinary means of communication. Telepathy rests upon clairvoyance (which see) for its foundation. The mind is aroused to action in two ways, by impressions received through the senses and by intuition. The mind

when acting upon impressions received through the senses is considered as the *objective mind;* when acting from intuition, the *subjective mind.* Telepathy is possible only when each mind concerned is in a subjective state. Furthermore, there must be a bond of sympathy between the persons.

Those who argue in favor of telepathy claim that when two people, A and B, are in the same room the mind of one acts upon the mind of the other in such a way as to produce the mental results desired by A upon B without any words, looks or other visible means of communication. A good illustration of this is found in the old game of "Willing." A wills that B perform a certain act, and B complies without any visible sign of communication. The Society for Psychical Research after extended investigation decided that in most cases there is some means of communication which the observer is not able to detect, because when the persons are in separate rooms the instances of success are no more than can be accounted for by chance. For instance, A wills that B write the number 10 on a card. There is a chance that A and B may be thinking of the same number, and that the number 10 will be written. On the other hand, there is a strong probability that they will not be thinking of the same number unless there is collusion. The experiments referred to showed ninety cases of success with A and B in the same room, when chance should allow only eight. With A and B in different rooms the instances of success were no more than could be accounted for by chance.

Those who accept the hypothesis of telepathy make use of it to account for warnings and messages from distant friends in times of special stress or danger, and to account for other similar phenomena.

There is a wide difference of opinion concerning the validity of the hypothesis on the part of those who have given the subject careful study. Some reject the theory entirely, while others believe that some evidence in its favor is "tangible," though not sufficient to warrant a full acceptance of the hypothesis. W.F.R.

Consult Jastrow's *Fact and Fable in Psychology;* Hyslop's *Psychical Research and Survival.*

**Relating to Various Beliefs.** The articles on the following topics, while not bearing directly on the subject treated above, may be of interest in this connection:

Alchemy
Astrology
Clairvoyance
Conjuring
Demonology
Divination
Faith Cure
Hypnotism
Magic
Medium
Mesmerism
Mind Reading
Necromancy
Occult
Palmistry
Phrenology
Physiognomy
Psychical Research
Psycho-Analysis
Spiritualism
Subconscious
Suggestion
Superstition
Theosophy
Trance
Witchcraft

**TELEPHONE,** *tel'e fohn,* a device for reproducing vocal sounds at a distance. The word means *to produce a sound afar off.* So perfect to-day is the instrument we call the telephone that the voice of a friend, in low tones over a thousand miles of wire, may be heard as distinctly and be as easily recognized as though the speaker were in an adjoining room, with open doors between. The transmission of the sound of the voice is instantaneous; while a word is being spoken into the transmitting device it is at the same time being heard in a receiving instrument, no matter how many miles away. The modest claims of an inventor in 1876, which nobody believed, were in a very few years developed into one of the most gigantic enterprises the world has ever seen. So new is the telephone that fully half of the people who are living to-day remember when they saw the first imperfect instruments.

**Description of the Modern Telephone.** A number of devices for reproducing the sounds of the voice have been tried, but the only one that has proved successful for practical use is the electric telephone.

In the modern electric telephone an alternating current flows along the line wire and reproduces the sound at the receiving end. Sound travels in copper wire with a speed of about two miles per second; if it were the sound which traveled over the telephone line it would require a thousand seconds, or more than sixteen minutes, to receive an answer to a spoken message over a line a thousand miles in length, since it would require five hundred seconds for the message to travel each way. The telephone does not transmit sound; it transmits an electric current and reproduces sound.

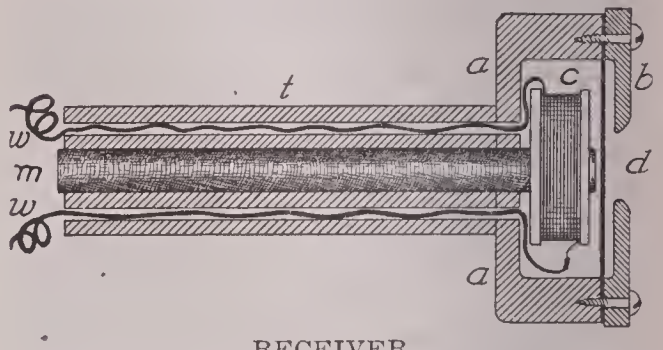
**The Receiver.** The telephone receiver consists of a steel magnet having a coil of fine wire around one end, and near to this end a disk or diaphragm of soft iron, held in place by a hard rubber casing (see illustration in subhead *How to Make a Simple Telephone*). When an electric current flows through the coil in the receiver in one direction it strengthens the magnetic field. This is the case when the magnetic force of the coil acts in the same direction

as that of the steel magnet. When the current flows in the opposite direction its own magnetic force is opposed to that of the steel magnet and, therefore, it weakens the magnetic field (see ELECTROMAGNET).

Since the current which flows over the telephone line wire from the transmitter is alternating, the magnetic field is alternately strengthened and weakened. The repeated changing of the magnetic force sets the disk vibrating. When the magnetic pull is stronger, the disk is pulled inward; when the pull is weaker, the disk is released and springs outward. The disk in the receiver is thus made to vibrate the same number of times per second as the disk in the transmitter; for every vibration of the transmitter diaphragm there is produced a similar vibration of the receiver diaphragm. The receiver diaphragm sets the air vibrating and produces sound waves of the same kind as those that are acting upon the transmitter diaphragm.

**The Microphone.** A simple instrument which illustrates the working of the telephone transmitter can be made of three electric light carbons. Two of the carbons are laid on a board a few inches apart, and the third carbon is laid across the first two. The first two carbons are then connected to a battery and telephone receiver. If a watch is laid on the board the ticking of the watch can be heard in the receiver. The ticking jars the board and each jar moves the upper carbon just a little and loosens the contact between the carbons. Between the ticks of the watch the upper carbon drops down and presses more firmly on the lower carbons. When the contact is loosened the battery current is made weaker, while a firmer contact makes the battery current stronger; thus as the watch ticks the battery current becomes alternately stronger and weaker. Each time the current becomes stronger the electromagnet in the receiver jerks the metal disk, and then the magnet lets the disk spring back as the current becomes weaker. Thus the disk is jerked back and forth as the watch ticks, and this motion of the disk produces sound in the air, the same kind of sound as the ticking of the watch.

**The Transmitter.** The telephone transmitter is a specially designed microphone. Two polished plates of carbon form the front and back of a circular box which is filled with carbon granules. The sides of the box are of insulating material, such as hard rubber. The carbon plate which forms the front of the box is attached firmly to the center of a metal diaphragm, which is just back of the mouthpiece (see page 5739). When one speaks near the mouthpiece the sound waves in the air set the disk in vibration; the carbon plate attached to the disk moves in and out a little as the disk vibrates. As the carbon plate moves in and out it repeatedly changes the pressure on the carbon granules, crowding them more tightly




RECEIVER

Simple construction, showing parts, such as a boy can master. The parts are (*a*) wooden pill box; (*b*) cap; (*c*) thin, flat spool, wound with copper wire; (*d*) thin disk of metal; (*t*) tube; (*w*) wires; (*m*) magnet.

together and releasing them many times a second. The carbon granules form a microphone, like the carbon rods, but with many contact points instead of two. A battery current flows through the carbon granules, and as the pressure on them changes the strength of the battery current changes; for when the granules are more tightly crowded together more current can flow, and when the granules are loosened less current can flow. Thus when the diaphragm vibrates the battery current continually varies in strength.

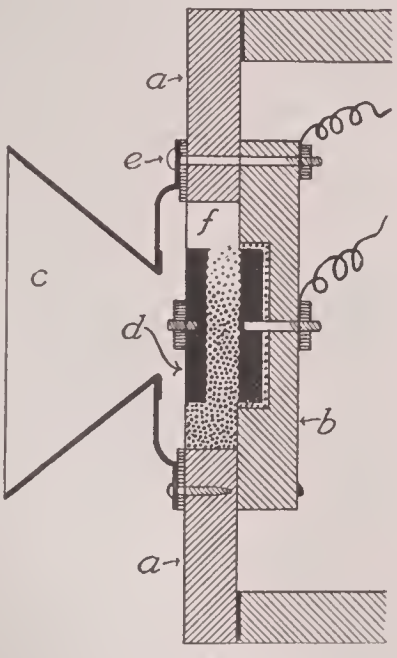
The battery current flows through the primary winding of a small induction coil, which is usually placed in the box back of the mouthpiece. As the battery current in the primary winding varies in strength, an alternating current is induced in the secondary winding of the induction coil. It is this alternating current which flows along the line wire to the receiver at the other end of the line. This alternating current varies as the sound of the voice varies, alternating more rapidly for sounds of higher pitch than for sounds of lower pitch, changing in strength as the sound changes in intensity, so that the pitch, the intensity and the quality of the sound produce corresponding frequency, intensity and form of electrical vibration. This in turn reproduces sound of the same quality and pitch as the original sound, but of less intensity because of loss of power in the line.

**The Switchboard.** The switchboard in a telephone exchange is for the purpose of making

electrical connection between the instruments of persons desiring to talk with each other. The one who makes the call removes his receiver from the hook and a "drop" at the switchboard is released, showing the telephone number of the person making the call. At the same instant the lighting of a small electric bulb calls the attention of the operator to the call. The operator then inserts an "answering plug" corresponding to the number calling. After ascertaining the number wanted the operator inserts the "calling plug" in that number and presses a key which closes the ringing circuit of the party who is being called; then she throws the key into position for talking. A plug consists of the ring-shaped terminals of the wires in the connecting cord.

The multiple switchboard used in large exchanges is so arranged that each operator can call from her own section of the switchboard any subscriber whose line is connected with that exchange, but she can be called by only a limited number. The advantages are that the calls are divided among a number of operators, and each operator can complete any call from her own section of the switchboard.

**How to Make a Simple Telephone.** Two boys can easily make and set up between their homes a good, working telephone line. It will be necessary to have two telephone receivers, which will serve also as transmitters. The receivers may be purchased in an electrical shop, or they may be made as follows: Cut off a piece of curtain pole about one inch and one-eighth in diameter and three and one-half inches long; or, if a wood-turning lathe is at hand, turn out such a piece. Bore a hole three-eighths of an inch in diameter lengthwise through the center. Bore two holes one-sixteenth inch in diameter lengthwise through the rod by the side of the first hole. The last two holes are for the wires to pass through.




TRANSMITTER

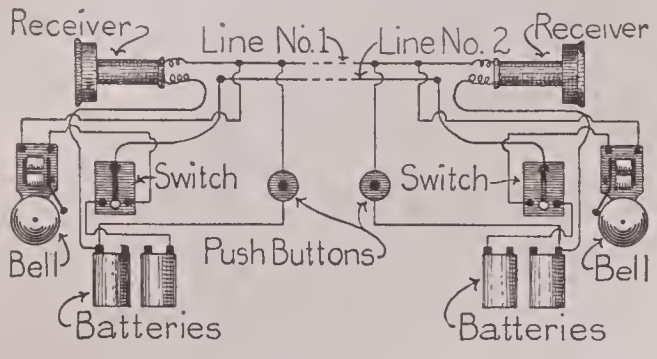
Simple sketch of the mechanism which receives and transmits the words spoken in telephone conversation. The parts are (*a*) cover; (*b*) round or square block; (*c*) mouthpiece; (*d*) diaphragm; (*e*) bolt; (*f*) granules of carbon.

A round, wooden box about two and one-half inches in diameter is needed; a wooden pill box can be used, or one can be turned on the lathe. If a pill box is used two wooden lugs must be glued to the bottom of the box to hold the screws by which the cap is fastened. If the box is lathe-turned the sides can be made thick enough for the screws. The cap is made of thin wood, hard rubber, or hard fiber, cut to fit the box and having a hole about half an inch in diameter in the center. It must have a thin rim or collar to separate it from the disk. The disk is made of thin, soft iron, such as photographers use for tintypes, and this must be of the thinnest variety. The magnet is made of a piece of steel rod three-eighths of an inch in diameter and four and one-quarter inches long. If soft steel is used, it can be hardened by heating it red hot and then plunging it into cold water. The steel rod can be magnetized at the nearest electric light plant, where the dynamo tender will no doubt be willing to hold it for a few minutes against the field magnet of one of the large dynamos. The parts described, when put together, appear as in the illustration on page 5738, which represents the receiver as if it were sawed through lengthwise from end to end. In addition to the two receivers, two electric bells, two switches, two push buttons, and four dry cells are needed. These are connected as in the illustration on next page. Care must be taken to connect the dry cells in series, otherwise one battery will neutralize the effect of the other. The push buttons are for the purpose of ringing the bells, the switches for making the proper connections for ringing and talking. It will be well to set up both sets in one room and experiment with the switches and push buttons to learn how to make the proper connections before setting up the line between two houses, as corrections are then more easily made.

**Power Required for a Telephone.** The power required to operate a telephone is very small. The telephone receiver is more sensitive to an electric current, that is, it responds to a weaker current, than any other instrument in common use. The power required to ring an electric doorbell would keep millions of telephone receivers buzzing for an equal length of time. Many times as much power is required for the ringing of the telephone bell as for operating the talking circuit.

**Automatic Telephone.** This is a system of telephony which requires no operator at the switchboard. A system of electromagnets at the central station makes the connections. The devices for making connections, called selectors and connectors, not only select the number called for but make a busy test, ring the signal at the called station and complete the circuit of a talking current. The talking and ringing circuits are essentially the same as in the switchboard telephone.

The number is called by means of a dial. The caller's finger is inserted in the hole over the first figure, and the dial is rotated until the finger comes to the finger stop. Then the dial is released and springs back. Then the




ARRANGEMENT OF TELEPHONE LINES
Two boys can construct a simple line with two telephones, making connections as shown above.

second figure is taken in the same way, and so on until all the figures of the required number are taken. The dial is connected to a wheel with ten teeth, to correspond to the ten figures on the dial. When the dial is turned to the tenth figure, the wheel by means of its teeth makes and breaks the circuit ten times. This electromagnet is in the selector which takes the place of a switchboard. Two electromagnets in the selector, both operated by the turning of the dial, make the connections. There are in the selector one hundred contacts, ten rows of ten contacts each, arranged in a semicircular bank. Each contact consists of a free tongue or strip projecting inward toward the center of the curve. A vertical rod at the center carries two springs which can sweep over and under the contact strips, the two springs clasping a strip and making a firm contact. These two springs are called a "wiper." By raising the rod and turning it, the wiper can be made to connect with any one of the 100 contact strips. The use of the electromagnets is to raise and turn the rod to the position required to connect with the number desired. On the rod is a row of ratchet teeth, and the armature of the electromagnet operates a pawl which turns the ratchet wheel. Each time the circuit is closed the electromagnet pulls up its armature and lifts the rod one notch. When the circuit is broken the armature drops, and the pawl catches the next notch, the rod being prevented from slipping back by a "dog."

The first figure of the number called determines the number of notches the rod is raised. For example, if 5 is the first figure, the dial is first turned from 5 to the finger stop. This gives five impulses to the electromagnet armature, raising the rod five notches, and raising the wiper to the fifth row of contacts. Another electromagnet acting horizontally turns the rod on its axis by means of a pawl and a set of teeth arranged in a circle around the rod. For example, if 6 is the second figure, six impulses are given to the horizontal magnet, turning the rod six notches and connecting the wiper with the sixth contact. Connection is then made with the number 56. For an exchange of not more than a hundred subscribers one selector for each subscriber makes all the connections. If there are more than 100 and not more than 10,000 subscribers, additional sets of selectors must be used. The first selector acts as a connector, and connects the subscriber to a certain selector in another group of 100 selectors. This selector then completes the connection as desired. In this case there are four figures in the number called.

**Some Special Applications of the Telephone.** The electrophone is a telephone specially arranged to enable subscribers to listen to performances in theaters, concert halls, etc. A special transmitter more sensitive than the ordinary is used. A number of subscribers may be connected to the same transmitter.

The telephone fire alarm has the advantage over other fire alarm systems in that it not only rings in an alarm signal, but enables the person sending in the alarm to give particulars to the officials.

In war the telephone is used to keep the commander-in-chief in touch with every portion of the army. The line wires are usually of thin, bare, copper wire wound on a reel, one man letting out the wire as he rides along, another following and by means of hooked rods lifting the wire to branches of trees for insulation. The earth is used for the return circuit. A metal rod at each end of the line is driven into the damp ground or into living trees where the sap makes the connection. A buzzer is used for signaling, and the Morse code is commonly used, as such signals are

transmitted more accurately than the sounds of the voice. The complete set is made very light and compact. On a war vessel the commander is in telephonic communication with every part of the ship. The instruments are made very substantial, to withstand the shocks to which they are subjected, some being bullet proof.

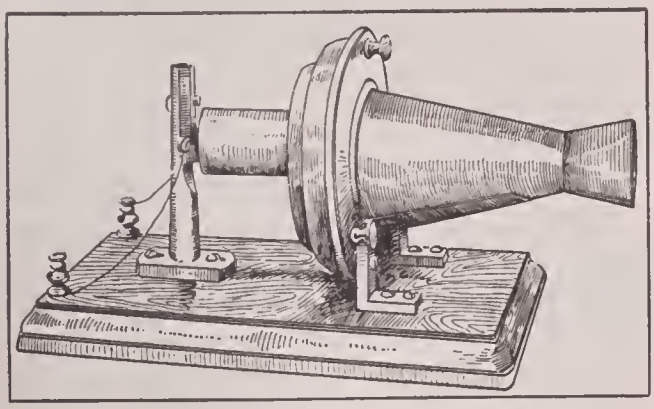
The helmets of divers are fitted with transmitters so that the diver is in communication with the boat above.

For railway service a telegraph line may be made to serve as a telephone line. The telephone is extensively used in train dispatching, its advantage over the telegraph being greater speed and the fact that it does not require a trained telegraph operator to serve as train dispatcher. Telephone sets are installed at sidings, crossings, water tanks and other similar places so that a train crew may, in case of emergency, communicate quickly with the train dispatcher. Many railroads, in addition to the dispatching circuit, install also a message circuit and frequently a block line for communication with the operators of interlocking switches and block signals.

Another important branch of the telephone industry is the private exchange, in reality a telephone system under private control. Some private exchanges possess more telephones on their lines than are required to care for the business of cities of considerable size. Every large business house has its own private exchange for communication between the various departments of the house. As a rule these private exchanges also connect with the public exchange so that any department may make either a local city call or a long-distance call through the private exchange, just as over an ordinary telephone. E.E.B.

## *Brief History of the Telephone*

Soon after the invention of the Morse telegraph, the idea of "talking by telegraph" began to grow in the minds of inventors. The outgrowth of this idea was the modern telephone. The telephone which was first patented and first exhibited to the public was that of Alexander Graham Bell. His patent, dated March 7, 1876, was for "certain new and useful improvements in telegraphy." One of these "improvements" was "the method of transmitting vocal and other sounds by telegraphy." In the Bell telephone the transmitter and the receiver were constructed on the same principle as the receiver of the modern telephone. Each receiver had a piece of parchment tightly stretched over a circular frame and a piece of soft iron fastened to the center of the parchment. An electromagnet within the frame was placed with one end near, but not touching, the parchment.



THE FIRST BELL TELEPHONE

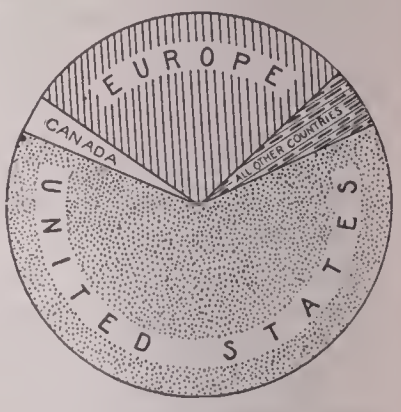
The Bell telephone was first exhibited to the public at the Centennial Exposition in Philadelphia in 1876, and the new invention was received with incredulity and ridicule. Bell was called "a crank who says he can talk through a wire." He had to prove the worth of his invention. To do this he borrowed a telegraph line in Boston, having a length of two miles, and with a friend held a conversation over the wire, the first sustained conversation by telephone, and the report of this conversation was published in a Boston newspaper. Soon after this Bell lectured in Salem, and a report of the lecture was sent by telephone to the Boston *Globe,* the first news transmitted by telephone. This aroused public interest, and in the following year (1877) the telephone business made a beginning.

In May, 1877, a young man named Holmes, who installed burglar alarms in business houses in Boston, borrowed five telephones and set them up in five banks, connecting them to the wires of the burglar alarm. The five telephones could be connected by a switch in Holmes' office. This was the first telephone exchange; it was a crude affair compared with a modern exchange. In the same month a man named Emery leased two telephones, paying twenty dollars, the first money transaction in the telephone business. From this small beginning the business grew until, in August, 1877, there were 778 telephones in use. But this was insignificant for such an important invention as

the telephone. Capital could not be secured to develop the business. Bell had associated with him three men, Hubbard, Saunders and Watson. In the midst of their discouragement The Western Union Telegraph Company came out in opposition to Bell, claiming that he was not the original inventor of the telephone, but that its company, under the name of the American Speaking-Telephone Company, was prepared to supply "superior telephones with all the latest improvements." This looked like defeat for Bell, but instead it stimulated interest in the telephone to such an extent that capital began to come in to Bell and his associates, and in two months they had fifty thousand dollars and were leasing telephones at the rate of a thousand a month.

In 1878 the Bell Telephone Company was organized under the management of Theodore N. Vail, with a capital of $450,000. But the battle was not over. The Western Union Telegraph Company owned the Edison transmitter, while the Bell Company had only the Bell receiver, which served as both receiver and transmitter. At this juncture Francis Blake came to the Bell Company with a transmitter of his own invention which he offered to sell for stock. His offer was accepted, and the Blake transmitter, proving superior to the Edison, gave the Bell Company the advantage it needed. The Western Union next attacked the legality of the Bell patents. The fight, which continued for eleven years and comprised six hundred lawsuits, was decided in Bell's favor. This was the end of the difficulties. Bell stock jumped to fabulous prices. By 1898 the company had installed its first million telephones. So large has the telephone business become that the Bell patent is recognized as the most valuable patent ever issued in any country.

**Present Extent of Telephone Service.** *In the United States.* Nowhere else in the world has the telephone industry grown as rapidly as in the United States. Comparisons show that while in England there is one telephone for every 100 people there are ten telephones for the same number in the United States. Chicago has more telephones in proportion to population than any other city in the world, there being one for every six people. New York City averages about one instrument for every ten people. While farms in England are practically without telephone connection there is in the United States approximately a rural telephone for every two farms. Each telephone in the great Bell System in the United States represents an investment of $126, and the gross revenue from it is $41.75. The total telephone investment in all countries in 1914 was $1,729,000,000, and there were 28,000,000 miles of wire. Of this total the United States had 18,000,000 and Canada 890,000 miles.




THE WORLD'S TELEPHONES

Nearly three-fourths of the number of telephones in the world are in service in the United States.

In the American Union there are 12,480,000 poles, a number sufficient to build a stockade around California, while the wire on which 30,000,000 messages a year are transmitted, if in a single line, would reach 625 times around the world. Of the 8,000,000 telephones in use 5,000,000 are owned by the American Bell Company and 3,000,000 belong to independent companies.

*In Canada.* In Alberta, Manitoba and Saskatchewan are telephone systems owned by the provincial government. In the entire Dominion in 1914 there were thirty-five municipal exchanges, 368 stock companies, 133 coöperative companies, thirty-one owned in partnership and 113 in the hands of private individuals, a total of 680 telephone companies in the Dominion. There are in all 371,000 telephones in use, for the maintenance of which 890,000 miles of wire are required. The cost of the entire property and equipment of Canadian telephone companies is approximately $57,000,000. The diagram in this article shows the proportion of telephones in Canada to those in use in the entire world. E.E.B.

Consult Wilder's *Telephone Principles and Practice:* Gibson's *How Telegraphs and Telephones Work.*

**TELEPHONE,** Wireless. See Wireless Telephone.

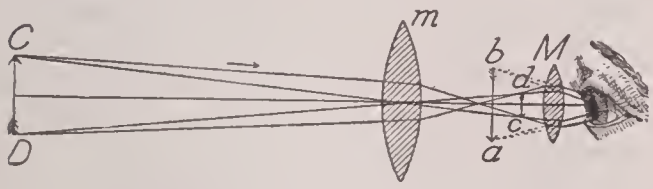
**TELESCOPE,** *tel'e skohp,* a long tube having an arrangement of lenses, used for viewing distant objects like the stars. It was the telescope that gave to man an idea of the vastness of the universe and of the smallness of his own world, floating like a grain of sand in the immensity of space. It overthrew existing notions of man's destiny and importance in the scheme of things and forced him to shape a new philosophy. In fact, the revolution wrought by

the telescope was so great that it can hardly be exaggerated.

The transforming power of the telescope on man's thinking was shown from the very invention of the instrument in the seventeenth century. Though he was not the original inventor, Galileo is given credit for bringing out the first practical instrument. His first telescope was a crude affair, and the best one he was able to devise before his death magnified but thirty times. Nevertheless, he was able to discern four of the satellites of Jupiter and to discover characteristics of the sun, the moon and other heavenly bodies that had not been known before.

Under the action of a powerful lens, the summer heavens are transformed, and they swarm with countless glittering points of light. The naked eye may see between two thousand and three thousand of these stars or suns; the telescope reveals a multitude that has been estimated at a hundred million. This great number is of course only an estimate, but patient astronomers have charted about 600,000. Stars that seem single to the unaided vision are split up by the telescope into two or three stars turning about one another in space. The Milky Way, which makes but a luminous patch across the sky, is dissolved into countless multitudes of distinct stars. Among the seven chief stars of the Pleiades the telescope shows a star cluster in which 2,326 stars have been counted.

**Structure.** The essential parts of a telescope are an *objective* (also called *object glass* and *object lens*) for the formation of an image of the object under observation, and an *eyepiece* for magnifying the image. These parts are set in




PRINCIPLE OF THE TELESCOPE
Explanation appears in text.

a tube so constructed that the observer can lengthen or shorten the distance between them. Astronomical telescopes are of two types, refracting and reflecting. In refractors the objective is a large convex lens of long focus, and the eyepiece a convex lens of short focus. In reflectors the object glass is a concave mirror which reflects the rays of light to a focus.

The accompanying diagram shows the principle of the astronomical refractor. The object viewed is marked *CD; m* is the objective, and it forms an inverted image *cd*. This is viewed through the eyepiece *M*, which produces a magnified image, *ab*, of the first image. The first image, *cd*, is as much smaller than the magnified image, *ab*, as the focal distance of the eyepiece is smaller than that of the objective. The objective has to be made large in order to collect enough light to permit considerable magnifying of the image without too much loss of distinctness.

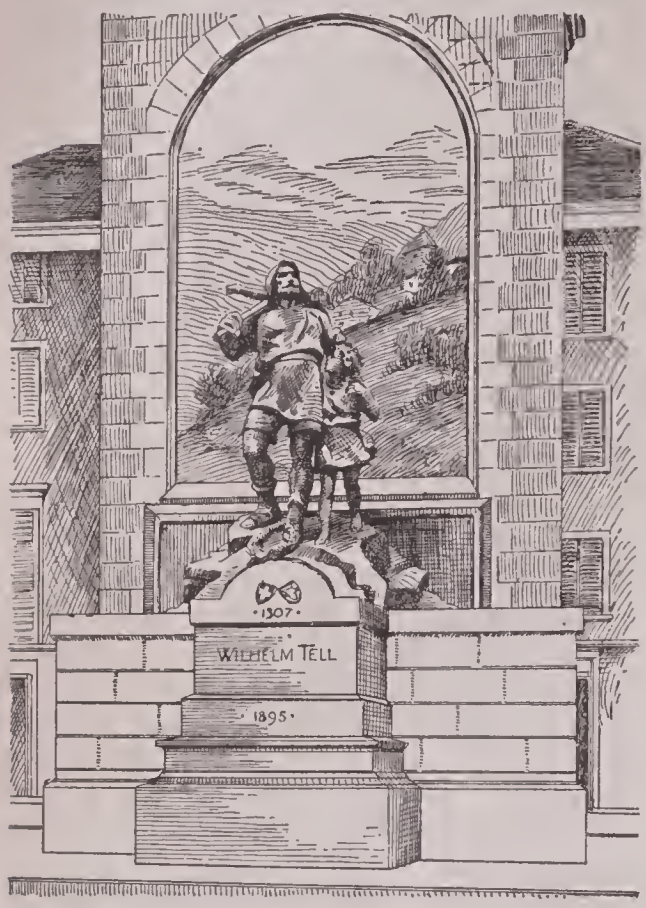
Terrestrial telescopes, which are constructed for viewing objects on the earth, have two double-convex lenses between the eyepiece and the objective, and as the rays diverge from the inverted image they cross and form an erect, magnified image. The inversion of the image which takes place in astronomical instruments does not interfere with the accuracy of observations made by the astronomer.

**Great Modern Telescopes.** The largest refracting telescope in the world is that in the Yerkes Observatory, on the north shore of Lake Geneva, Wisconsin. It is the property of the University of Chicago. The object lens has an aperture of forty inches and weighs about 760 pounds. The tube is sixty-two feet in length, has a weight of six tons, and is mounted upon a massive cast-iron column, which rests upon a solid concrete foundation. Clockwork located in an upper section of the column drives the mechanism. The apparatus occupies a dome ninety feet in diameter, which has a rising floor seventy-five feet across. This floor moves through a range of twenty-three feet between two balconies, and is close to the lowest point when the observer is viewing a star near the zenith (see YERKES OBSERVATORY). Second only to the Yerkes refractor is the thirty-six-inch telescope of the Lick Observatory at Mount Hamilton, California (see page 3406).

The great reflecting telescope of Lord Rosse, at Birr Castle, in Ireland, was for a long time the largest of its kind in the world. Since 1914 it has been a possession of the South Kensington Museum of Science. The reflecting mirror of this instrument is six feet across, but the telescope is surpassed in size by those of Mount Wilson Solar Observatory (8 feet, 4 inches) and the Dominion Observatory, near Victoria, British Columbia (6 feet, 1 inch). Other notable reflectors are those at Harvard University, Melbourne and Paris. The telescope at Harvard, which has a mirror five feet across, has been used with remarkable success in photographing the stars. How telescopes are used in photography is told in the article ASTRONOMY. G.B.D.

Consult Clerke's *History of Astronomy;* Lockyer's *Star-Gazing, Past and Present.*

**TELL,** WILLIAM, a legendary hero of Switzerland, whose story, though perhaps not historically accurate, typifies the spirit that gave the land its freedom. According to the legend, Tell was a peasant of Uri, one of the Forest




TELL STATUE
At Altdorf, Switzerland.

Cantons. In 1307, when the country lay restive under the oppressive rule of the Austrians, he appeared one day in the market place of Altdorf. Here, on top of a pole, the Austrian bailiff Gessler had set up a cap to which he commanded all Swiss to do homage. Tell refused to humble himself, and was told that he would be put to death unless he could save himself by shooting an apple from the head of his little son. This harrowing feat he accomplished, but when he confessed that a second arrow in his quiver was intended for the heart of Gessler, should the first not hit the mark but should kill his son, he was seized and placed in chains. While he was being carried across a lake in the tyrant's boat a great storm arose. In fear of his life Gessler ordered the prisoner unbound, that he might help guide the boat. Tell, when his chains were loosed, sprang ashore, and soon sent an arrow into the heart of his persecutor. The story then connects itself with the revolt of the Forest Cantons, in which Tell is given a conspicuous part. This popular tale is the basis of Schiller's drama *Wilhelm Tell* and of an opera by Rossini.

Consult Schmidt's *William Tell*, translation by Upton; Marshall's *Stories of William Tell and His Friends.*

**TEM'PE,** VALE OF, a beautiful valley in Thessaly, between Mount Olympus and Mount Ossa. It is about four and a half miles in length, with many beautiful glades and openings into the precipitous sides of the mountains. The river Peneus, now called the Salambria, flows through it. In mythology the Vale of Tempe is noted as one of the favorite haunts of Apollo, and through all time it has been praised in song and verse.

**TEMPERANCE,** *tem'per ans,* a term which signifies moderation in the exercise of the functions and privileges of life. "Let your moderation be known unto all men," is one of the oft-quoted teachings of the Apostle Paul. Moderation in eating and drinking, in the enjoyment of pleasures, in the expression of opinion, in work and in play is good for all. Society has found it necessary to make many of its laws not for its moderate members but for those who know no moderation; so it is sometimes necessary to deny a people a privilege which would be harmless if moderately enjoyed. Restrictive laws in regard to personal conduct would not be necessary if every one were temperate in all his actions.

In the nineteenth century temperance came to have a special meaning, referring to the use of alcoholic beverages. In fact, it came to mean not moderation, but *total abstinence.* Nowadays when the temperance movement is spoken of one thinks instinctively of the spread of prohibition. The progress made by this movement is summarized in these volumes in the article PROHIBITION.

Consult Towns' *Habits That Handicap.*

**Related Subjects.** In connection with the general subject of temperance the following articles may be consulted:

Alcoholic Drinks
Anti-Saloon League
Good Templars
License
Local Option
Prohibition
Prohibition Party
Woman's Christian Temperance Union

**TEMPERATURE,** *tem'per a ture.* In physics *temperature* is a term used to describe the state of a body with reference to its ability to communicate heat to other bodies. When two bodies are brought into contact and one transfers heat to the other, it is evident that the

one receiving heat has a lower temperature than the other. Temperature is measured by the thermometer, an instrument having a graduated scale of degrees between two fixed points, the freezing point and the boiling point. There are in general use two scales, Centigrade (C.) and Fahrenheit (F.), the former having the freezing point at zero (0°) and the latter 32° above zero. The boiling points are respectively 100° and 212°. In theory there is a point at which the vibrations constituting heat cease, and this point (273° below Centigrade zero) is known as the *absolute zero of temperature*. In practice this point has never been reached, but it is used as a convenient standard in scientific calculations. In physical geography temperature refers to atmospheric conditions in various localities.

**Related Subjects.** In connection with this brief discussion on temperature the reader may consult the following articles in these volumes:

| | |
|---|---|
| Centigrade | Thermometer |
| Climate | Weather Bureau |
| Heat | Zone |

**TEM'PERING,** the process of imparting to metals, principally iron and steel, a required degree of hardness. In industry the term is now almost exclusively restricted to hardening steel. Numerous methods of tempering are in use, but all depend upon the same principle—heating and cooling the metal. When iron or steel is heated red hot and suddenly cooled in water it becomes hard and brittle. Cast iron is cooled so rapidly in the molds that it is brittle. On the other hand, if allowed to cool slowly, the iron or steel becomes soft and flexible. Red-hot steel rods, when allowed to cool slowly in the air, can be bent into any desired form and are easily cut with a file or metal saw. Between these extremes there are many degrees of hardness, each adapting the article to the special use for which it was designed.

To secure the requisite temper of a fine tool requires skill and experience. To illustrate, in tempering razors the blade is forged, and when it is red hot the edge is dipped in water for a moment to the depth of a half inch, then withdrawn and quickly polished on an emery belt. This part of the blade becomes heated from the thicker part that was not immersed in the water. As the temperature rises the polished surface changes color. By experience the workman knows from the color when the required temperature is reached. He then plunges the blade into water.

The colors and the tools to which they apply are:

Pale yellow (about 430° F.); hammer faces, planer tools, engravers' tools.

Straw yellow (about 460° F.); dies, drills, punches, etc.

Brown yellow (about 500° F.); plane irons, gouges, twist drills and coopers' tools.

Light purple (about 530° F.); surgical instruments, augers, cold chisels.

Dark purple (about 550° F.); axes, springs, saws, screw drivers and needles.

**TEM'PLARS,** KNIGHTS, a military and religious organization founded at Jerusalem in 1118 or 1119. Nine French knights organized it and bound themselves by vows of obedience, poverty and chastity, and took as their special work the protection of the Holy Sepulcher and the defense of pilgrims to the sacred spots. The society grew rapidly in numbers, though only nobles or knights were at first admitted, and its power increased rapidly. Though individuals were pledged to poverty, the order as a whole had no such obligations, and along with the special privileges granted it by the Pope and various European rulers it acquired many rich land holdings. At the height of its power it is said to have possessed no fewer than 9,000 manors throughout Europe. Secular priests were admitted to forward the specifically religious purposes and subordinate members for the menial tasks, while the knights proper gave all their time to fighting.

At this they acquitted themselves splendidly, and much of the history of what was most effective in the Crusades is but a history of the Templars. Their personal bravery was remarkable, and during the long attempt to hold Jerusalem for Christianity over 20,000 of them met death on the field. The Latin kings of Jerusalem gave them quarters in the palace, which was built on the site of Solomon's Temple; from this fact, the knights took their name. Fighting side by side with them when the struggle with the infidels was fiercest, and opposing them in bitterest rivalry when conditions were less compelling, was the other great military and religious order, the Knights Hospitalers of Saint John.

The kings of Europe, impoverished in many instances by the Crusades, looked with envy upon the possessions of the Templars and decided to gain them for themselves. King Philip IV of France and Pope Clement V were the leaders of this opposition, which in 1307 culminated in the death by torture of the grand master and many knights and the disbanding

of the order in most countries. Crimes of all sorts were laid at the door of the order to give a semblance of justice to the procedure, but it is certain that while individual members in many cases doubtless deserved all the censure brought against them, the society as a whole had not become degenerate in its aims and methods. Such of the property as was not seized by the sovereigns was turned over to the rival order, the Hospitalers.

**Modern Knights Templars.** One of the degrees in Free Masonry is that of Knight Templar, and to attain this rank, which is one of the highest in the Order, one must first be a Master Mason and Royal Arch Mason. See MASONRY. A.MC C.

**TEMPLE,** *tem'p'l,* the center of Jewish worship from the time of Solomon to the destruction of Jerusalem by the Romans. The site, on the hill of Zion, was chosen by David, who also gathered the materials for the first, or Solomon's Temple. The walls of this structure, sixty cubits long (a cubit was eighteen inches), twenty wide and thirty high, were of stone, hewn and polished at the quarries, so that there was no sound of hammer or tool of iron in the building (*I Kings* VI, 7). The whole edifice, inside and out, was covered with costly woods, overlaid with gold. Within were the Holy of Holies, containing the Ark of the Covenant, and the holy place, containing the altar of incense, the table of shewbread and the golden candlestick. In front was a porch, ten cubits wide, with an imposing pillar on either side of the entrance. Surrounding the building on three sides were corridors and cells, rising three stories in height. The Temple faced the east, and before it stood the brazen altar of burnt offering.

The magnificence of Solomon's Temple, its impressive priesthood and its costly sacrifices centralized the worship of the people, and other places of worship disappeared. It was destroyed by Nebuchadnezzar, in B. C. 586. Zerubabel's temple, erected after the Exile, was far less splendid than Solomon's. In it the Holy of Holies was empty, the Ark having been lost at the time of the captivity. This temple was replaced (19 B. C. to 64 A. D.) by the costly temple of Herod, in which Jesus walked and taught, and which, in its turn, was destroyed by the Romans in A. D. 70.

**TEMPLE,** TEX., a trade center in Bell County, in the east-central part of the state, 178 miles northeast of San Antonio. It was founded in 1881 by the Gulf, Colorado & Santa Fe Railroad, which established and maintains here extensive car shops and a large hospital. The Missouri, Kansas & Texas Railroad also enters the city, and there is electric service to Belton, the county seat. Temple contains a Federal building, a Carnegie Library, the Temple Sanitarium and the King's Daughters' State Hospital. In addition to car shops, the city has cottonseed-oil mills, a candy factory and flour mills, and there is an important export trade in cotton, grains and live stock. The city was chartered in 1884. Population in 1910, 10,995; in 1916, 13,504 (Federal estimate).

**TEM'PO,** a musical term meaning *time,* derived from the Italian, and expressing the rate of movement in which a musical composition is to be played. The degrees of time are divided into two classes—those which suggest the rate of movement, such as *lento* (slow), *adagio* (gentle), *moderato* (moderately), *presto* (quick), etc., and those which represent a quality which may influence the time, such as *vivace* (lively), *animato* (cheerful). See MUSIC, subhead *Tempo,* and table on page 4026.

**TENACITY,** *te nas'i ti,* a property possessed by all matter. It is the resistance which substances make to being pulled or torn apart, and depends upon the material, the shape of the body, the temperature and the length of time the weight is applied. Tenacity is measured in terms of the weight necessary to break the body. Hollow bodies have greater relative resistance than have solids. The bones of animals, the quills of bird feathers, bamboo cane and cornstalks are illustrations. A cable of many wires woven together is much stronger than a solid rod of the same size and material, because the sum of the tenacities of the wires is greater than that of the rod. Among the metals, cast steel has the greatest tenacity, and lead is among the weakest in this respect. See MATTER; STRENGTH OF MATERIALS.

**TEN'ANT,** a term derived from the Latin word *teneo,* meaning *I hold,* signifying one who has temporary use and occupation of lands or buildings belonging to another. The terms and period of time for which the property is held are defined in a written agreement which is signed by the owner, or landlord, and by the tenant. This document is known as a *lease.*

The relation of landlord and tenant had its origin in the feudal system of the Middle Ages, and some of the feudal obligations of both the lessor and lessee still survive in the present laws. The landlord must defend his

tenant's title, while the latter may not sublease the property or any part of it without the consent of the landlord. The tenant is usually responsible for repairs made necessary by the misuse of the premises, but specific agreements in regard to repairs are usually included in the lease. If the buildings are rendered untenantable by fire the landlord may terminate the lease, or if he does not make repairs within thirty days the lease ceases to be binding.

If the tenant fails to pay the stipulated rent or does not keep other terms of the lease, the landlord or his representatives may terminate the lease and may legally enter the premises, expel the tenant and remove his goods. The lessor also has a lien upon the household goods of the tenant as security for rent. He may sue for any rent that may be due by the terms of the lease, and the tenant is responsible for the attorney's fees and other costs. The heirs, successors or administrators of both tenant and landlord are bound by the terms of the lease.

A *tenant at will* is one who occupies property for an indefinite period, which may be ended at any time desired by either landlord or tenant. The latter is entitled to a notice of removal, generally sixty days before the day ending the term of occupancy. If he has growing crops on the rented land, he may enter later and gather them.

A *tenant at suffrance* is one who occupies property without the expressed consent of the owner or after his term of possession has expired. He may be ejected at any time by the landlord.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Contract | Lease |
| Law | Real Estate |

**TEN'DER,** a term in law relating to payment of debt. See LEGAL TENDER.

**TENDONS,** *ten'dunz,* or **SINEWS,** *sin'uze,* strong, fibrous cords which attach the muscles to the bones. They may be round, or long and flat, and are composed of close, tough, parallel fibers. The tapering end of each muscle merges directly into one end of a tendon, the other end of which is attached to the bone in a distinct groove in the bone substance. At this extremity, too, the tendons are firmly imbedded in the periosteum, or protective sheath which encases the bones. It is by means of the tendons that the movements of the muscles are transmitted to the bones. See MUSCLES.

**TEN'EMENT,** a name applied to any house constructed for the occupancy of two or more families, the legal definition as to the number of families varying somewhat in different cities. The word is derived from the Latin *tenementum,* meaning *a holding,* and as popularly (though not legally) considered is restricted to houses occupied by the poorer classes of city dwellers. All large municipalities are confronted by the tenement-house problem; the movement to better housing conditions is engaging the attention of city governments and social workers everywhere.

**Tenement-House Regulation.** The chief subjects of tenement-house regulation are light and ventilation, protection against fire, water supply, sanitary standards and overcrowding. Because of laxity in regard to building regulations, many cities have permitted certain sections to decline into so-called slum districts. Old houses in such districts, from which the better classes have withdrawn, have been converted into tenements, and new ones have been erected with no regard for the health and safety of the occupants. Large families are crowded into small, dark, ill-smelling rooms, which become centers not only of disease but of crime. A deplorable number of young people and children learn vicious habits in such homes because there is no adequate provision for privacy, while lack of light, air and sanitation lowers the health standards, brings about epidemics and causes an excessive death rate among babies.

Such conditions as these, which Jacob A. Riis describes so graphically in his *How the Other Half Lives,* are responsible for the movement to better the lot of the tenement people. In New York City the problem has been attacked by the state legislature, but usually building and housing regulations are passed by city ordinances. The remedies include the tearing down or improvement of existing tenements, and the building of new ones according to specified rules. Health boards, sanitary inspectors, building commissions and the like are appointed to see that the laws are obeyed.

Consult "Slums of the Great Cities," in *Seventh Annual Report* of the United States Commissioner of Labor; "Improved Housing," in *Bulletin No. 6* of the New York School of Philanthropy.

**TENERIFFE,** *ten er if',* the largest of the Canary Islands (which see).

**TENIERS,** in English, *ten'yerz,* the family name of two noted Flemish painters, father and son, both of whom excelled in the portrayal of scenes from everyday life.

**David Teniers,** THE ELDER (1582-1649), was born at Antwerp. He was a pupil of Rubens. His paintings, especially those presenting rustic games and weddings, are noted for their fidelity to nature, their charm of color treatment and excellence of composition. They include *Peasants Carousing in Front of a Tavern, A Dutch Kitchen,* now in the Metropolitan Museum, New York, and *Playing at Bowls.*

**David Teniers,** THE YOUNGER (1610-1690), who excelled in all the qualities that characterized his father's work, was called "the prince of genre painting." He often introduced cats or monkeys into his small canvases, all active and picturesque, although his best works are those with the fewest figures. The younger Teniers was born at Antwerp and received his first art instructions from his father. He arose quickly in popular favor, and won the patronage of leading noblemen of his country. In 1650 he took up his residence at Brussels as court painter, where he remained for the rest of his life. Few artists equaled him in the charm with which he depicted open-air life. Often he would participate in the merrymakings so as to obtain an intimate picture of the people whose lives he has perpetuated in hundreds of paintings distributed among the great galleries of Europe. Among his canvases are *A Merry Repast, Peasants' Dance, The Barber Shop* and *Marriage Festival,* now in the Metropolitan Museum, New York City.

**TENNESSEE,** *ten ch see',* one of the south-central states of the American Union, popularly known as the BIG BEND STATE, because of the great loop which the Tennessee River describes across the state.

**Size and Location.** Tennessee has more states touching its borders than any other state of the Union except Missouri. The Mississippi River is its western boundary, and separates it from portions of Arkansas and Missouri. The greater part of its straight northern border line adjoins Kentucky, with a small stretch at the eastern end meeting the Virginia line. Mississippi, Alabama and Georgia touch it on the south, while the state of North Carolina bounds it on the east. Having an area of 42,022 square miles, of which 335 square miles are water, it ranks thirty-fourth in size among the states. Its area is nearly equal to that of the state of Virginia, and it is 982 square miles in excess of the area of Ohio.

**People.** Although much of the state is mountainous and there are comparatively few large cities, Tennessee is thickly settled, and ranks seventeenth among the states in population. In 1910 the inhabitants numbered 2,184,789, of whom 473,088 were negroes and 18,459 were of foreign birth, chiefly German, Russian, Irish, English and Italian. The average density of the population was 52.4 per square mile, over one and one-third times the average for the United States. Only 18.2 per cent of the inhabitants lived in cities and towns, the largest of which are Memphis; Nashville, the capital; Chattanooga, Knoxville, Jackson and Johnson City, all having a population of over 10,000. On January 1, 1917, the population was estimated to be 2,296,316.

The Baptist Church has the largest number of members, followed by the Methodist, Presbyterian, Disciples of Christ and Roman Catholic denominations.

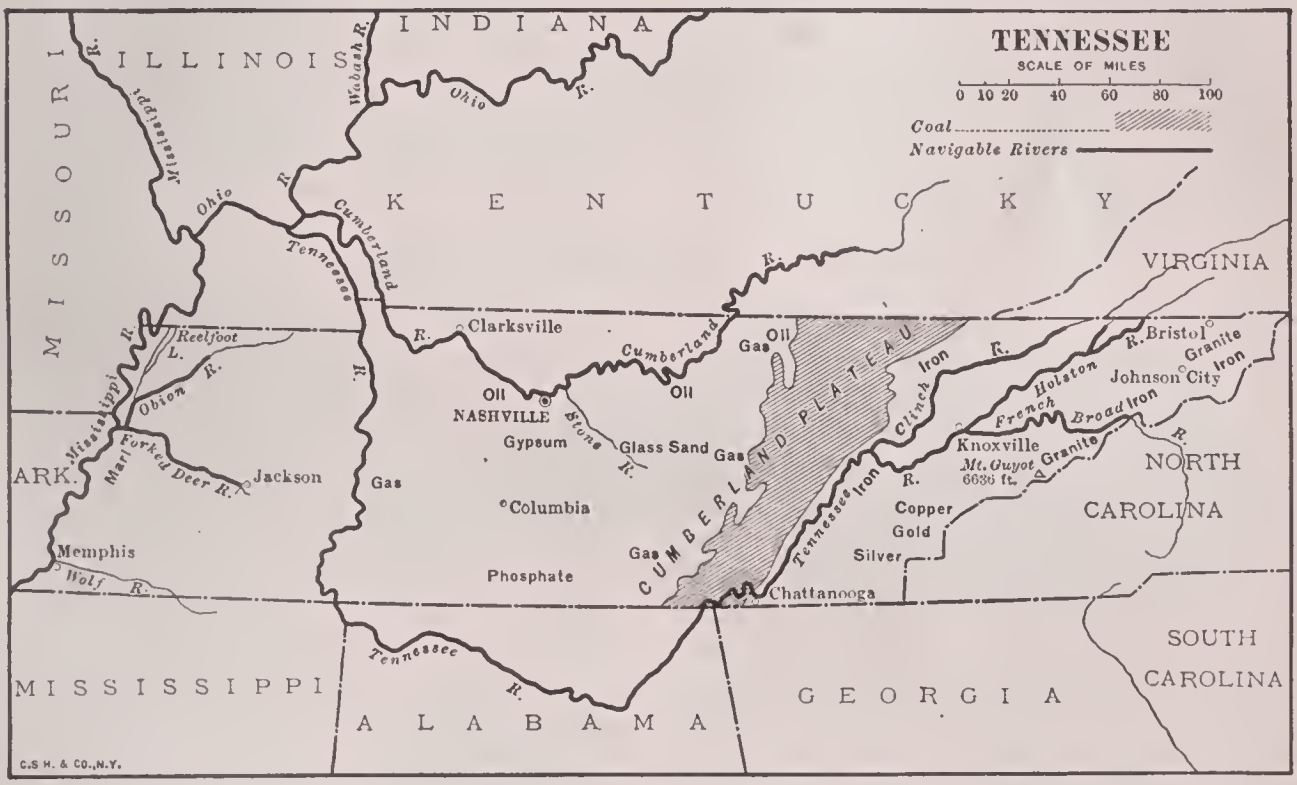
**Education.** Public schools are administered by county boards of education, supervised by a state board consisting of the governor, state superintendent of public instruction and six other members. In addition to the regular school fund, derived from county taxation, the interest on the permanent state fund and twenty-five per cent of the gross revenue of the state, the schools have the use of all money in the state treasury on January 1 of each year, which is about $250,000.

There are separate schools for white and colored pupils, and one or more high schools are maintained in each county. In several counties education was compulsory before 1914, and in that year compulsory education was made state-

wide. Over one-half of the total school population is enrolled in schools, and illiteracy is steadily decreasing. Advancement has been made in the education of the secluded eastern mountaineers, who formerly were cut off from such advantages.

The state maintains a normal school in each of four educational districts of the state and a university at Knoxville. The George Peabody College for Teachers receives state aid (see PEABODY EDUCATION FUND). There are many private and denominational institutions for higher education, including the University of Chattanooga at Chattanooga; Vanderbilt University at Nashville; Carson and Newman College at Nashville, Knoxville and Bolivar; an institute for the blind at Nashville; a school for the deaf and dumb at Knoxville; a Confederate soldiers' home near Nashville, on "The Hermitage," formerly the home of Andrew Jackson; a reform school for boys in Davidson County; an industrial school and a penitentiary at Nashville. There are also county almshouses and asylums and many private institutions of charity.

**The Land.** Tennessee is a series of rocky heights and deep valleys, hills and dales, and broad and rolling fields, with elevations ranging from the loftiest mountains of the Appalachian system to the marshy bottom lands along the Mississippi River. The Unaka, or




OUTLINE MAP OF TENNESSEE

Showing the boundaries, navigable rivers, chief cities, locations of mineral wealth, and the highest point of land in the state.

Jefferson City; Cumberland University at Lebanon; the University of the South at Sewanee, and Christian Brothers at Memphis. Prominent schools for the colored are Fisk University, Roger Williams University and Walden University at Nashville; Le Moyne Normal Institute at Memphis, and Knoxville College at Knoxville. Montgomery Bell, an academy for boys, and Ward-Belmont, Boscobel and Saint Cecilia's seminaries for girls are well known schools at Nashville.

The charitable and penal institutions are controlled by boards of trustees under the general supervision of a state board of charities, consisting of the governor and six other members. There are state hospitals for the insane near

Great Smoky Range, in which there are sixteen peaks rising above 6,000 feet, forms the eastern border of the state with North Carolina. In this rugged, shaggy wilderness, Mount Guyot, the highest peak in the state, rises 6,636 feet, and there are several others nearly as high.

The valley of the Eastern Tennessee, a sea of wavelike ridges of rich land, lies between these mountains and the Cumberland table-land, which forms a rampart of rocky cliffs 1,000 feet above the valley. This section is cut by the deep, fertile Sequatchie Valley, and contains several detached mountains, Lookout Mountain being among them. The jagged spurs of the Cumberland Plateau project on the west into the sandy "Highlands." These form a highland

rim surrounding a great basin which resembles a drained lake and is the finest agricultural region of the state.

In the western section, the blue-grass region of the state, are the irregular valleys of the Tennessee and Cumberland rivers, sloping towards the Mississippi River and divided from the bottom lands by a ridge of cliffs. The lowland and the "Bottoms" are dotted with lakes, marshes and patches of dark, forested swamps.

**Rivers and Lakes.** The Mississippi, Tennessee and Cumberland rivers form the great drainage system of the state. The Tennessee, the longest tributary of the Ohio, crosses the state twice; with its tributaries it drains most of the state, and furnishes many miles of navigable waterway. The Cumberland, another affluent of the Ohio, is the most important river commercially. Winding through a region of great undeveloped coal fields, it promises to be one of the country's great highways for coal traffic. A number of small rivers drain the extreme western section into the Mississippi.

There are few lakes of any size, the largest being Reelfoot, a marshy lake near the Mississippi, in the northwestern part of the state.

**Climate.** Except on the mountain heights and in the bottom lands, the climate of Tennessee is mild and delightful. However, great variation occurs, because of the diversity of elevation. On the banks of the Mississippi the climate is like that of Upper Louisiana, while in the lofty mountains the average temperature is equal to that of Montreal. The state is in the same latitude as Northern Africa and Southern Italy, but the lack of moderating sea winds makes the Tennessee summers hotter and the winters colder. The average annual temperature ranges from 62° in the Mississippi lowlands to 45° in the Unaka Mountains. The annual precipitation is fifty inches, the rainfall being heaviest in late winter and early spring.

## *Sources of the State's Wealth*

**Agriculture.** Tennessee is an agricultural state. Over three-fourths of the area of the state is in farms; and about sixty per cent of the population is engaged in agriculture. The central basin and western and northeastern parts of the state are the important agricultural sections, and large quantities of Indian corn, cotton, hay and forage, wheat, tobacco, oats, sorghum, peanuts, fruits and vegetables are grown. In average years Tennessee ranks eleventh among the states in the production of corn, its chief crop, fourth in the tobacco output, and tenth in its cotton production. Truck farming is extensive, and large shipments of fruits and vegetables are sent to Northern markets. The raising of live stock is important, and Tennessee ranks high in the breeding of fine horses, cattle and sheep. In 1915 Tennessee ranked twenty-first among the states in the total value of agricultural products.

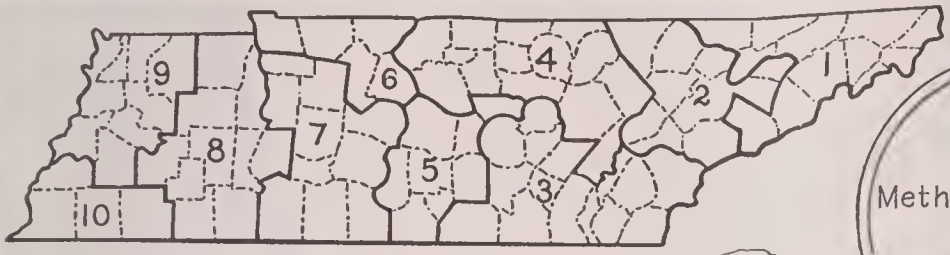
**Forests.** The state was originally covered with heavy forests, and one-half of its area still is woodland. One hundred forty varieties of timber are grown, but white oak embraces two-thirds of the entire stand. There is no state appropriation for forest fire protection, but a fire warden system has been organized.

**Minerals.** Coal is the most important mineral product of the state. In the Cumberland table-land the fields of bituminous and semi-bituminous coal cover 4,400 square miles. With a normal output valued at about $8,000,000, Tennessee ranks thirteenth among the states in the production of coal, and holds about the same place in the output of coke. Iron ores are found in forty-four counties of the state in workable quantities, and Tennessee usually ranks ninth in the production of this metal. The state also ranks high in copper production, in its by-product, sulphuric acid, and in zinc. Deposits of stratified phosphate rock cover seventy-five square miles in the western portion of the highlands and central basin, and Tennessee is surpassed only by Florida in its output. Marble of rare purity and beauty, sandstone, limestone and slate are quarried. There are small quantities of silver, gold, barytes, manganese, potter's clay and petroleum.

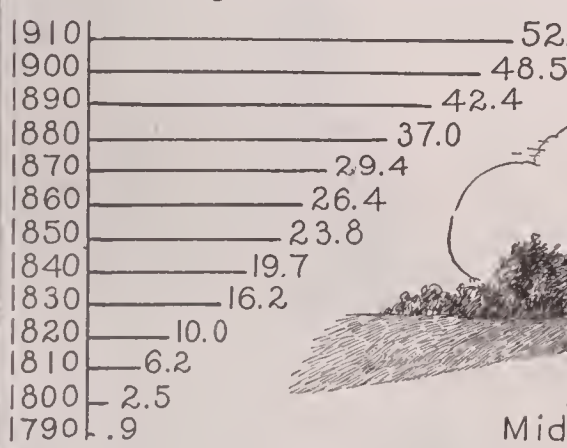
**Manufactures.** The raw materials for Tennessee's manufacturing industries are largely supplied by the natural resources of the state. Flour milling and lumbering are the chief industries, followed by iron and steel working, the manufacture of textiles and of cottonseed oil. Tennessee ranks twenty-sixth among the states in the value of manufactured products. Safety laws regulating conditions in factories have been passed, and since 1915 the labor of women has been restricted to fifty-seven hours a week.

**Transportation.** Tennessee has extensive facilities for water transportation in the Mississippi, Tennessee and Cumberland rivers. The Mississippi affords communication with the en-

# TENNESSEE




Congressional Districts

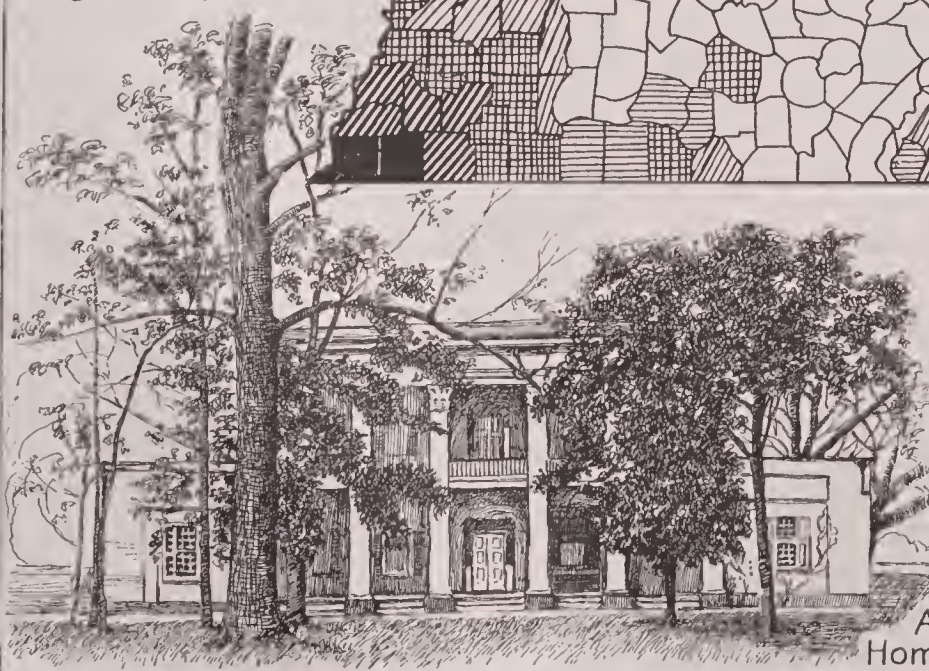



Increase in Population Per Sq. Mi. by Decades

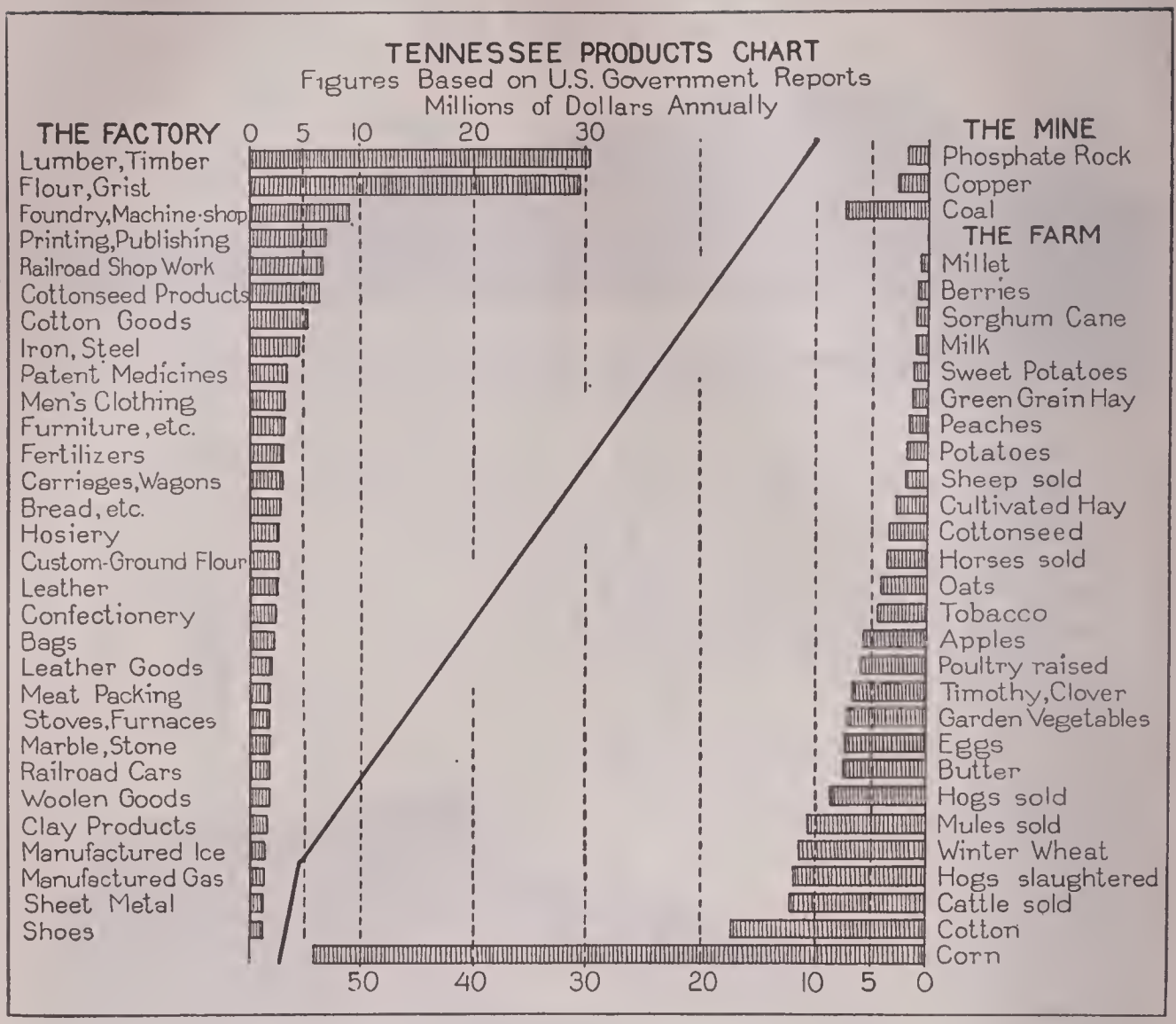
Middle Tennessee Normal School, Murfreesboro

Cotton Map

Counties Having
- Over 50,000 Acres
- 25,000 to 50,000 Acres
- 10,000 to 25,000 Acres
- 1,000 to 10,000 Acres
- 250 to 1,000 Acres



"The Hermitage", Andrew Jackson's Home, near Nashville




tire Mississippi Valley and the Gulf ports. The Tennessee is navigable for small vessels from Knoxville to the Ohio River, and the Cumberland is open to traffic about 500 miles. The latter river is the chief highway for the transportation of coal, and improvements are being made by the government which will make it navigable ten months of the year. Memphis, Chattanooga and Knoxville are ports of entry.

There are over 4,000 miles of steam roads and about 500 miles of electric railway in the state. The most important lines are the Nashville, Chattanooga & Saint Louis, the Louisville & Nashville, the Illinois Central, the Southern and the Tennessee Central.

In 1915 a state highway department was created, which is maintained by one-tenth of the annual motor-vehicle tax.

## *Government and History*

**Government.** The third and present constitution of the state was adopted in 1870. Amendments may be proposed once in six years; before becoming part of the constitution, amendments must be approved by the majority of voters and by the assembly and by two-thirds of the succeeding legislature. Every attempt to amend the present constitution in important matters has been unsuccessful. The question of calling a convention for its revision is to be submitted to all male citizens who have paid a poll tax and have resided in the state one year.

The *legislative power* is vested in an assembly consisting of a house of representatives of ninety-nine members and a senate of thirty-three members. No clergyman is eligible to election to either house. The assembly meets biennially; the regular sessions are limited to seventy-five days and special sessions to twenty days.

The *executive department* consists of the governor, elected for two years; the secretary of state, comptroller and treasurer, elected by the legislature; the attorney-general, appointed

# *RESEARCH QUESTIONS ON TENNESSEE*

**(An Outline suitable for Tennessee will be found with the article "State.")**

What organization which played a large part in history in the period after the War of Secession originated in this state?

Where is Tennessee's "drowned forest," and how was it submerged?

Is the highest point of land in the state loftier or less lofty than the highest point of each state upon which Tennessee borders?

What laws relating to industrial conditions has the state passed which shows its progressive character?

How were the eastern and western sections of the state divided in their sentiments on the slavery question in the years before the War of Secession?

What presidents are buried in the state? How many of these were born within the boundaries of the state?

How many states produce more coal than Tennessee? Name at least ten of these. (See article COAL, page 1446.)

When did Tennessee become a state? How many states besides the original thirteen were in the Union when it was admitted?

For what is the famous estate of a President of the United States in this state now used?

What is the Peabody Education Fund, and what school in Tennessee derives benefit from it?

How large a proportion of the area is still wooded? How does the state compare in this respect with Arkansas?

By what name was the territory comprising Tennessee known when it first came into the possession of the United States?

From what four sources is the revenue for the upkeep of the schools derived?

What class of the inhabitants, formerly neglected educationally, are now receiving the benefits of education?

How does Tennessee resemble Illinois in the character of its chief crop? How do the two states compare in the value of their chief crop?

Who called Tennessee the first free and independent commonwealth in this country established by men of American birth, and with what right is it so called?

If a man in the former days in Tennessee wanted an article valued at six shillings but had no money, how might he pay for it?

Why are the winters colder and the summers hotter in Tennessee than in Southern Italy, which is in the same latitude?

To what state did this territory originally belong? From what regions did the first settlers come?

How many states border upon Tennessee? How many other states have an equal number of boundary states?

How many states are larger? How many of these larger states have a greater population than Tennessee? (See list in article UNITED STATES.)

What stand has the state taken on the liquor question?

What two popular names does the state bear? Discover from the map the appropriateness of one of them? To what does the other refer?

What makes the Cumberland River so important commercially?

What is the railway mileage of the state to each hundred square miles of area? How does it compare in this respect with each of the states upon which it borders?

by the supreme court; the superintendent of public instruction, commissioners of agriculture, statistics and mines, assayer, entomologist and officials of the penitentiary, appointed by the governor. The governor may not serve more than three consecutive terms.

The *judicial department* consists of a supreme court and court of civil appeals, each having five judges elected for eight years, twelve chancery courts, nineteen circuit courts and county courts, each having one judge elected for eight years. There are also justices of the peace, and, in certain cities, there are recorder's courts.

Both the sale and manufacture of liquor is prohibited. Mothers' pension laws and child-labor acts have been passed.

**Settlement and Early Government.** Tennessee was probably first visited by De Soto, Marquette and La Salle in their explorations of the Mississippi Valley. The territory comprising the present state was included with North Carolina in an English grant to Sir Walter Raleigh. In 1750 colonists from Virginia reached and named the Cumberland River and Mountains. In 1754 and 1757 settlements were made by pioneers from North Carolina, but these were soon destroyed by the Indians.

The first permanent settlements were made in 1769, 1771 and 1772 by the Watauga Association, a company of colonists from Virginia and North Carolina who settled along the Watauga River. They organized a free and independent commonwealth, said by Theodore Roosevelt to be the first one of this country established by men of American birth. After the political insurrection in North Carolina in 1771, many of the "regulator" party opposed to the royal government made their way into the rugged wilderness of Tennessee, and in 1776 the territory was annexed to North Carolina as the District of Washington, the first spot in America named in honor of George Washington. The hardy mountaineers served in both the British and the Continental armies.

In 1784 North Carolina ceded the territory of Tennessee to the United States, but the inhabitants revolted and formed the state of Frankland, or Franklin, with Sevier as governor. Congress ignored the new state, and the jurisdiction of North Carolina was again established in 1788. Two years later Tennessee was ceded to Congress as the "Territory South of the Ohio." A steady stream of immigrants poured into it, and after a long struggle Indian and Spanish hostilities were suppressed, the final struggle occurring in 1794.

**Statehood.** On June 1, 1796, Tennessee was admitted as the sixteenth state of the Union. It was the first state created out of government territory; Kentucky and Vermont, which were previously admitted, were formed from territory belonging to individual states. The Tennessee troops under Andrew Jackson played a distinguished part in the War of 1812, and in the Creek and Seminole wars. In the war with Mexico in 1847, Tennessee won the name of "The Volunteer State," when 30,000 men enlisted at the call for 2,800 state troops.

The western, middle and eastern sections of the state remained divided in sentiment and almost distinct commonwealths until after the War of Secession. The eastern section was strongly Union in sentiment, and published the first abolition paper in the United States. In the question of secession the Confederate element finally prevailed, and Tennessee seceded June 8, 1861; it was the last of the states to withdraw from the Union. Next to Virginia, Tennessee was the chief battle ground of the war. There were 454 battles fought in the state, notable among them being the capture of forts Henry and Donelson, and the battles of Shiloh, Murfreesboro, Chattanooga, Lookout Mountain, Missionary Ridge, Franklin and Nashville. Tennessee, readmitted to the Union, July 24, 1866, was the first of the Confederate states to return to the Federal government. The state escaped the corrupt "carpetbag" government of Northern politicians, but the Ku-Klux Klan originated within its borders.

Tennessee boasts many distinguished men, including three Presidents of the United States—Jackson, Polk and Johnson—many Cabinet officers and Justices of the Supreme Court, and such military heroes as Farragut, Houston and Forrest.

**Other Items of Interest.** Reelfoot Lake, eighteen miles long and very shallow, largely covers a drowned forest, which was submerged during an earthquake. Through the clear water the dead branches of the trees may be plainly seen.

In one of Tennessee's caves was found, long ago, the skeleton of a mastodon, and the cave is consequently known as Big Bone Cave.

From the top of Lookout Mountain, just on the boundary line of Tennessee, it is said that seven states may be seen.

In the early days coin was so scarce that no fewer than twenty articles were declared legal tender and given a definite value. Thus bacon was valued at sixpence a pound, a fox skin at

one shilling, sixpence, and a beaver skin at six shillings.

Warren County, Tennessee, is circular in shape and Overton is nearly so.

Violent storms of any sort are rare in this state, and the average velocity of the winds is low.

The Ku-Klux Klan began as a mere youthful prank, at Pulaski, Tennessee, but in a short time spread over the entire South.

Three Presidents of the United States, Jackson, Polk and Johnson, are buried in Tennessee, Jackson at "The Hermitage," Polk at Nashville, and Johnson at Greeneville. E.B.P.

Consult McGee's *History of Tennessee;* Haywood's *Civil and Political History of Tennessee.*

**Related Subjects.** The reader who is interested in Tennessee will find much that is helpful in the following articles in these volumes:

CITIES

| | |
|---|---|
| Bristol | Knoxville |
| Chattanooga | Memphis |
| Jackson | Nashville |
| Johnson City | |

HISTORY

| | |
|---|---|
| Chattanooga, Battle of | Lookout Mountain, subhead *Battle of Lookout Mountain* |
| Fort Henry and Fort Donelson | Murfreesboro, Battle of |
| Frankland | Shiloh, Battle of |
| Ku-Klux Klan | |

LEADING PRODUCTS

| | |
|---|---|
| Coke | Phosphates |
| Cotton | Tobacco |
| Iron | |

PHYSICAL FEATURES

| | |
|---|---|
| Cumberland Mountains | Mississippi River |
| Cumberland River | Tennessee River |

**TENNESSEE,** UNIVERSITY OF, a coeducational institution, located at Knoxville, one of the largest state institutions in the South. It was first chartered in 1794 as Blount College and became the University of Tennessee in 1879. The university is organized into the colleges of liberal arts, commerce, engineering, agriculture, law, medicine (including the school of pharmacy), dentistry, the summer school and the graduate school. The colleges of medicine and dentistry are at Memphis. In 1902 a teachers' summer school was opened on the campus, and it now has an enrolment of nearly 3,000 students. As a part of the extension work of the university, short courses in agriculture are given during the winter in a number of places throughout the state. The faculty numbers about 200, and the student enrolment is over 4,500. There are 40,000 volumes in the library.

**TENNESSEE RIVER,** the largest tributary of the Ohio, formed by the meeting of the Holston and the North Fork rivers at Kingsport, Tenn. These rivers rise in the Virginia Alleghanies. The main stream flows southwestward through Tennessee, enters Alabama at its northeast corner, dips in a great curve and flows out again at its northwest corner, reentering Tennessee. It then flows northward through that state and northwest across Kentucky, joining the Ohio at Paducah. Including the Holston, it is 1,200 miles long. Since the completion of the Muscle Shoals Canal (1889) around the shoals between Florence and Decatur, Ala., the Tennessee has been made navigable for a distance of over 500 miles, and is used for transporting farm merchandise, lumber, iron ore and cotton.

**TENNIEL,** *ten'yel,* SIR JOHN (1820-1914), an English cartoonist and book illustrator, famed for his political cartoons made for *Punch,* and for his inimitable illustrations that add so much to the charm of Carroll's *Alice in Wonderland* and *Through the Looking-glass.* He was born in London, and was practically a self-trained artist. When he became cartoonist for *Punch,* in 1851, he had already won distinction as the painter of a fresco, *Saint Cecilia,* for the House of Lords. His position on the staff of *Punch* was retained for half a century. Tenniel's work was admired for its originality and dignity, no less than for excellence of technique. Besides the *Alice* books he illustrated *Aesop's Fables,* Moore's *Lalla Rookh, The Ingoldsby Legends* and various other works.

**TENNIS,** *ten'is,* a game for two players, which was the forerunner of lawn tennis. It is played on an oblong covered court with a ball about two and one-half inches in diameter, and a racket heavier and with a smaller face than that used in the better known form of the game. At one end of the court is a division for spectators, called a *dedans.* The scoring and the object of the game are much the same as in lawn tennis, which is now usually called simply tennis. See LAWN TENNIS.

**TENNYSON,** *ten'i sun,* ALFRED (1809-1892), one of the great English poets of the Victorian Age, was born August 6, 1809. His father, the rector of Somersby, was a man of learning and of refined taste, and in the home a vivid imagination and a love for beauty were developed in Alfred and his brothers and sisters by familiarity with fairy legends and other fanciful tales. When seven years old, Alfred was sent to the Louth Grammar School, where he remained five years, and from that time on his education was cared for by his father until

1828, when he entered Cambridge University. In these years spent in his quiet, pleasant home he had plenty of time for reading and reflection, for the close observation of nature and for practice in poetic composition, and the first results of the period were seen in the little volume published in 1827, by Charles and Alfred Tennyson, entitled *Poems by Two Brothers.* The book attracted no attention, and brought to its authors only about $100.

**Poetry of Student Days.** The constantly secluded life at home had made the brothers rather shy, and when they entered the university they did not find it easy to make

ALFRED TENNYSON
One of the noblest and most representative figures in nineteenth-century literature.

friends. Gradually, however, some of the brightest young men of the school became acquainted with the brothers and made them members of the select society known as "The Apostles." In 1829 Alfred distinguished himself by winning the Chancellor's prize for his blank verse poem, *Timbuctoo,* and in the following year he published his *Poems, Chiefly Lyrical.* Critics found faults in this volume, but recognized, too, the promise of the young author; indeed, the melody of such poems as *Mariana* and *Oriana* could not fail to make itself felt.

Shortly before his father's death in 1831 Tennyson left Cambridge without receiving a degree. Two years later he published another volume of *Poems,* among which appeared some of the most exquisite of his lyrics, among them *The Lady of Shalott, The Palace of Art, The Lotus-Eaters, The Dream of Fair Women* and *Oenone.* Again the critics did not spare his work, and a particularly savage article appeared in the *Quarterly Review;* but had Tennyson written nothing after that time he would by that volume have proved his right to rank with the great English poets.

**His Greatest Years.** In 1833 an event occurred which affected the poet so profoundly that he remained in seclusion for ten years. This was the sudden death of his best friend, Arthur Henry Hallam, son of the historian. At the end of the long period of silence appeared a third collection of *Poems* containing, with others of special note, *Locksley Hall, Morte d'Arthur, Dora, Ulysses* and *Break, Break, Break,* and in 1847 was produced *The Princess,* a long narrative poem which is perhaps most noteworthy for the exquisitely finished songs interspersed through it. Among these are *Sweet and Low; The Splendor Falls on Castle Walls; Tears, Idle Tears,* and *As Through the Land.* These poems are marked by a depth of thought not found in any that preceded them; but the spiritual development which came as a direct result of Hallam's death found its fullest expression in the long elegy *In Memoriam,* composed of lyrics written at various times, but published as one poem in 1850. This masterpiece is equaled in its class only by Milton's *Lycidas* and Shelley's *Adonais.* Much longer than either, it presents all phases of the poet's grief, and takes up the most serious questions as to life, death and immortality.

**Appointment as Poet Laureate.** In the same year Tennyson was made poet laureate. He was then enabled to purchase the estate of Farringford, on the Isle of Wight, and to marry Miss Emily Sellwood, the lady to whom he had been long betrothed. Years later the poet said of her, "The peace of God came into my life before the altar when I wedded her." In 1868 Tennyson built Aldworth, his house near Haselmere, and thereafter passed his time between the new home and Farringford. Eight years before his death he was made Baron of Aldworth and Farringford.

After his appointment to the laureateship he produced *Maud,* a dramatic representation of a morbid man; *The Idylls of the King,* an idealistic treatment of the King Arthur legends, and perhaps his most popular work; *Enoch Arden,* portraying one of the noblest heroes in literature; the dramas *Queen Mary* and *Becket; Locksley Hall Sixty Years After; Demeter,* and several other volumes of poems and dramas. The Arthurian legends always had a fascination

for him, and before his use of them in the *Idylls* he had touched on them in such poems as *The Lady of Shalott* and *Sir Galahad.*

**Estimate of His Work.** Melody is perhaps the most notable characteristic of Tennyson's verse. At the outset it was sometimes secured at the expense of thought—the little lyric *Where Claribel Low Lieth,* for instance, is almost pure music without an idea. Later, however, the union of thought and melody was what he everywhere sought, and his ability to make sound fit sense is shown clearly in such contrasting lines as these from the *Passing of Arthur.* The first group are rugged and harsh, as fits the scene they describe; the second smooth, flowing, beautiful:

The bare, black cliff clang'd round him, as he based
His feet on juts of slippery crag, that rang,
Sharp-smitten with the dint of armed heels.

And on a sudden, lo! the level lake,
And the long glories of the winter moon.

The music of his verse was but an expression of the love for harmony which was one of his strongest characteristics; and he was keenly sensitive to the suffering which he saw in the world—the discords in life's harmony. It was to science that he looked for the righting of the world's wrongs, and thus he has been called the poet of science. Evolution has a large place in his writings. A.MC C.

Consult Ainger's *Tennyson for the Young;* Lyall's *Tennyson,* in English Men of Letters Series; Cary's *Tennyson: His Home, His Friends, and His Work.*

**TENSE,** a word derived from the Latin *tempo,* meaning *time,* and used in grammar to denote a form taken by a verb to express action or state in relation to time. Tense is indicated by changes in the form of verbs and by the use of auxiliary words, as shown in the conjugations given below.

**Tense Forms of the Indicative.** There are three principal tense divisions in the indicative mode—present, past and future—but in each case the act may be viewed as completed at some definite time in the present, past or future. Hence there are also three *perfect* tenses, denoting *perfected* action or state. The following tables gives these six tenses:

| | |
|---|---|
| Present | I am, do, see, walk |
| Past | I was, did, saw, walked |
| Future | I shall be, do, see, walk |
| Present Perfect | I have been, done, seen, walked |
| Past Perfect | I had been, done, seen, walked |
| Future Perfect | I shall have been, done, seen, walked |

Action in the present, past and future may also be represented as continuing, or in progress, and is then expressed thus:

I am doing, seeing, walking
I was doing, seeing, walking
I shall be doing, seeing, walking

The perfect tenses likewise have a form which shows that the action is continuous—

I have been doing, seeing, walking
I had been doing, seeing, walking
I shall have been doing, seeing, walking

Transitive verbs, like *to see,* may be conjugated in all tenses in both the active and the passive voices. The passive forms are *I am seen, I was seen, I shall be seen, I am being seen,* etc.

*Past and Present Perfect.* These two tense forms are sometimes confused. The distinction between them is this: Whereas the past tense expresses action merely as belonging to past time, the present perfect expresses action as belonging to past time but also as touching the present. It is correct to say, *The Japanese have made rapid progress within the last decade;* also, *The Japanese made rapid progress during the last half of the nineteenth century.* In the first case the action is viewed as coming up to the present, and in the second case simply as taking place in past time. It is incorrect, on the other hand, to make such statements as, *I have left school five years ago,* or *I wrote a letter the past half hour.* The correct forms are, *I left school five years ago;* and, *I have written a letter the past half hour.*

*Past and Past Perfect.* Compare the following: *Washington was first inaugurated in 1789; Washington had already been inaugurated when the first national census was taken.* In the first sentence there is a simple statement of action in past time, and in the second a statement of an act completed *before some other specified act.*

*The Future Tenses.* The simple future tense denotes an action that will take place at one time in the future, while the future perfect views an action as one that will be completed before the occurrence of some other future act. The distinction may be seen in the following: *I shall leave to-morrow at ten o'clock; I shall have left to-morrow before they arrive.*

*Shall and Will.* Most grammarians make the following distinction between *shall* and *will,* two auxiliary verbs used in forming the future tenses of the indicative: When used with the first person, both singular and plural, *shall* denotes simple futurity; when used with the sec-

ond and third persons it denotes command or necessity. *Will* in the first person, singular and plural, denotes purpose or intention, and in the second and third persons, simple future action. These meanings are compared in the following:

| SIMPLE FUTURITY | COMMAND, NECESSITY OR INTENTION |
|---|---|
| I shall see you again | I will not apologize |
| You will know by to-morrow | You shall obey |
| He will arrive to-day | He shall make amends |

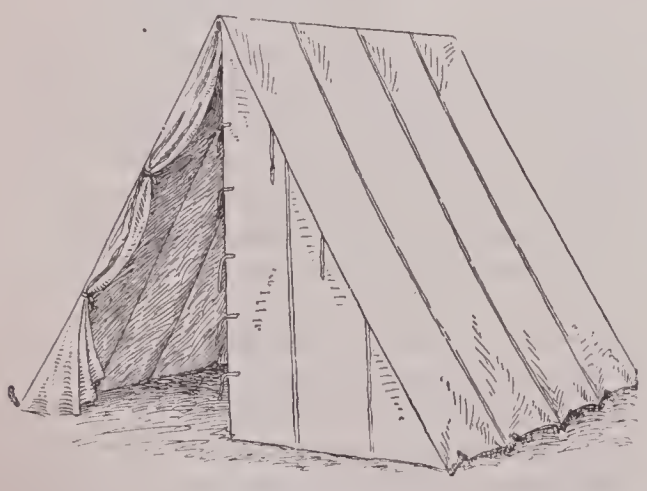
**Other Modes.** For tenses of the subjunctive and imperative modes, see MODE, page 3870.

**The Infinitive.** The infinitive has but two tenses—the present and perfect. The forms for both voices are as follows:

Present to love, to be loved
Perfect to have loved, to have been loved

**TENT,** a portable dwelling place, usually made of canvas. It is thought that tents are of Eastern origin, being introduced into Spain by Mohammedan invaders, from there spreading over Europe and later to America. The native Indians of North America made wigwams, tepees, or tents of bark and the skins of animals, probably long before white men set foot on the American continent. In many parts of Canada and the Northern United States the Indians still make their somewhat primitive dwellings, but for the most part have either learned to build houses or have adopted the modern canvas tent of the white man.

**Various Forms.** The simplest form of canvas tent follows the pattern of the Indian tepee;



AN "A" TENT

it is circular at the bottom and rises to a point in the center. The modern name for this tent is the *bell,* as it is bell-like in shape. This tent is used by nearly all armies and campers throughout the world. It is set up with a pole in the center, over which the tent is spread, pegs being driven into the ground at proper distances to which to attach ropes to keep the tent in position. The *"A"* tent (in the illustration) is equally simple in construction, and may be stretched over a ridgepole running from two upright poles and pegged down to the ground. The *wall tent* is the *"A"* tent with perpendicular walls to the height of two or three feet with the *A,* or gable, above, and is similarly erected and held in position. The wall tent has the advantage of giving more headroom than either the *"A"* or the "bell" tent.

A *marquee* is a large form of tent, chiefly devoted to show and social usages and to field hospitals with an army. The tents used by armies in peace times are quite different from those carried in war. In fact, the carrying of tents has in most armies been abandoned, except for what are called light "shelter tents," carried by each man. Modern war conditions do not allow of excess of weight in transport, and were full tent accommodations to be carried, it would necessitate the employment of at least double the usual number of wagons and animals for transport. Tents in active service have therefore given place to various temporary shelters. In the War of the Nations dugouts many feet below the surface of the earth sheltered fighters of all armies.

**Among the Nomads.** In the pastoral districts of Asia the main population has always lived in tents, and the rank and riches of the members of the various tribes are indicated by marks and symbols on their tents. The Bible speaks of the tents of Kedar, really Arabian tents of black goats' hair, which gave rise to the Eastern expression "black as the tents of Kedar." Even in modern times the nomadic Arab tribes carry with them their tents, and their homes are just where fancy or advantage may lead them to "pitch their tents." The tents of the East, however, are more elaborate than the military and camping-out tents of the West, being often divided into apartments, the partitions being of rugs and skins that, according to Western values, are almost priceless.

**Suggestions to Campers.** For campers in the United States and Canada, the procuring of a suitable tent is a simple matter. The choice is wide, and tent materials have been greatly improved within recent years. For ordinary purposes, the "bell" or *"A"* tent will be found most suitable. It is in the choice of locality and in the actual erection of the tent that experience is necessary. One of the simplest precautions is often neglected by parties camping out. That precaution is to avoid touching the sides

or top of the tent during storms. The drip of water through the canvas will not occur if the material is not touched from the inside, and if the roof is kept free from leaves. These facts should be borne in mind.

The digging of a trench round the tent is often regarded as unnecessary, yet neglect of this precaution has often turned a well-fitted tent into a morass. The trench to draw the water off, built with due regard to the slope of the ground on which the tent is pitched, should be regarded as one of the first essentials of comfortable camping out. Disasters would be less frequent if campers would apply good judgment and perhaps a few minutes' work daily to securing comfortable and hygienic surroundings. F.ST.A.

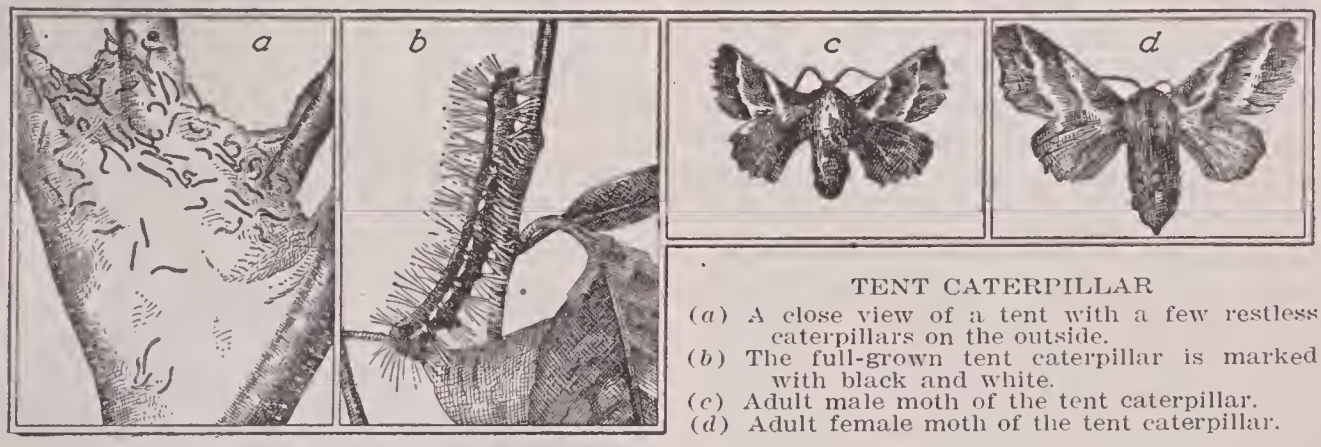
In this connection there will be found valuable material in the article CAMP, pages 1082-1086.

**TENT CATERPILLAR,** *kat'er pil er,* the larvae (young) of four species of silk-spinning moths, which feed upon the tender leaves of trees. They are so named because the moths spin tent-shaped webs. The most destructive and conspicuous species is the apple tree tent caterpillar. The moths are dull, reddish-brown, the forewings being marked with two oblique, pale stripes. In July they lay their eggs, about 300 in number, in distinct belts on the branches of the apple and wild cherry trees. By fall the minute black caterpillars are fully developed, but they hibernate in the egg. In the early spring they eat their way out of their protective covering of shell and spin their tentlike canopies in the crotch of a branch.

So ravenous are their appetites that the occupants of a single tent eat 12,000 young leaves. The caterpillars file out of their tent to feed in the middle of the morning and again in the afternoon; hence, effectively to exterminate them, the tent should be destroyed in the early morning or evening when the occupants are at home. Spraying the tent with kerosene will kill them. In June the caterpillars scatter in all directions to spin their cocoons in some protected cranny in fences and buildings. Within these silvery sacs they change to pupae, and in two or three weeks emerge as moths to repeat the life history of the species.

The forest tent caterpillar, or forest army worm, like the apple-tree tent caterpillar, is common in Eastern United States. The moths are lighter in color than the ones described above, and have dark lines on their forewings and a row of light dots down the middle of the back. Their tents are less conspicuous and their eggs belts are more nearly circular.

Two of the western kinds are the California tent caterpillar, which is found upon oak trees in the early spring, and another which infests fruit trees in late summer. W.F.R.




TENT CATERPILLAR

(*a*) A close view of a tent with a few restless caterpillars on the outside.
(*b*) The full-grown tent caterpillar is marked with black and white.
(*c*) Adult male moth of the tent caterpillar.
(*d*) Adult female moth of the tent caterpillar.

**TEN'URE OF OFFICE ACT,** the name given to two acts of the United States Congress which limited the President's power of removal of officers whom he had appointed. The first of these was passed in 1820, chiefly through the influence of William H. Crawford, then secretary of the treasury. Because it limited the term of a large number of appointive officers to four years, this act is usually said to have laid the foundation for the introduction of the "spoils system," under which a change in the national administration was accompanied by sweeping removals of officeholders and by the appointment of friends and political adherents of the new President to succeed them (see CIVIL SERVICE IN THE UNITED STATES, subhead *Civil Service Reform*).

More generally known than this act of 1820 is the act of 1867, which Congress passed over the veto of President Andrew Johnson. Since the foundation of the national government it had been the custom to allow the President to dismiss at his pleasure any officers appointed by him. As the President was responsible for the acts of his subordinates, and as the Constitu-

tion did not require consent from the Senate, that body had not interfered in behalf of dismissed officials, even when its consent had been necessary to the appointment. Shortly after Johnson's inauguration, however, Congress began to indicate its disapproval of the President's policy, and there was soon open discord between them on the questions of reconstruction. Lest Johnson should exercise his powers of removal and thus perhaps interfere with the Congressional plan of reconstruction, Congress passed the Tenure of Office Act, which required the Senate's consent to the dismissal of any official, including members of the Cabinet, whose appointment required its consent.

The law was a startling innovation in the American government, and Johnson not unreasonably felt that it was a mistake and perhaps unconstitutional. His disregard of it when he removed Edwin M. Stanton from the office of Secretary of War was one of the causes of his impeachment. The law, however, was quickly understood to be an unjustified emergency measure, and during Grant's administration it was modified. Finally, in 1887, the act as a whole was repealed after a struggle between President Cleveland and Congress. W.F.Z.

**TERENCE,** *ter'ens* (Publius Terentius Afer) (about 185-about 159 B.C.), a Latin playwright, born at Carthage. The date and the place of his birth have been the subject of much dispute, but he is said to have been carried to Rome as a slave and educated there by a Roman senator. His first play was *Andria,* an immediate success which gained for him admission into the best Roman society. He went to Greece to study the comedies of Menander and Apollodorus, which he freely translated and adapted. From this voyage he never returned; accounts vary greatly as to the manner of his death.

During his brief life he succeeded in winning a permanent reputation, and that, too, though he was in no way an original writer. His ideal was artistic perfection, and the chief merit of his work is the perfect picture he has given of Greek life in the third century B.C., for his writings reflect nothing of the spirit of his own age and country. Plautus excels him in comic power, but not in tenderness and wit and character drawing. His six extant comedies, possibly representing all he ever wrote, are *Andria, Hecyra, Heauton-timoroumenos, Eunuchus, Phormio* and *Adelphi.* Advanced Latin students in college courses read at least one of Terence's works.

**TERHUNE,** *ter hune',* MARY VIRGINIA (1831- ), an American novelist and writer on domestic science, better known as MARION HARLAND. She was born in Amelia County, Va., received a careful education at private schools and from tutors, and began very early to write for publication. Her first novel, *Alone,* appeared when she was but eighteen. This proved very successful, and her popularity grew with the appearance of her later novels, *The Hidden Path, Nemesis, Judith* and *A Gallant Fight.* She also wrote *Common Sense in the Household* and many articles for magazines and newspapers, largely on cookery and domestic economy. Her fiction has no great literary merit, but is interesting and of high moral tone. It is for her syndicated domestic science series of articles, extending over a period of many years, that she will long be remembered.

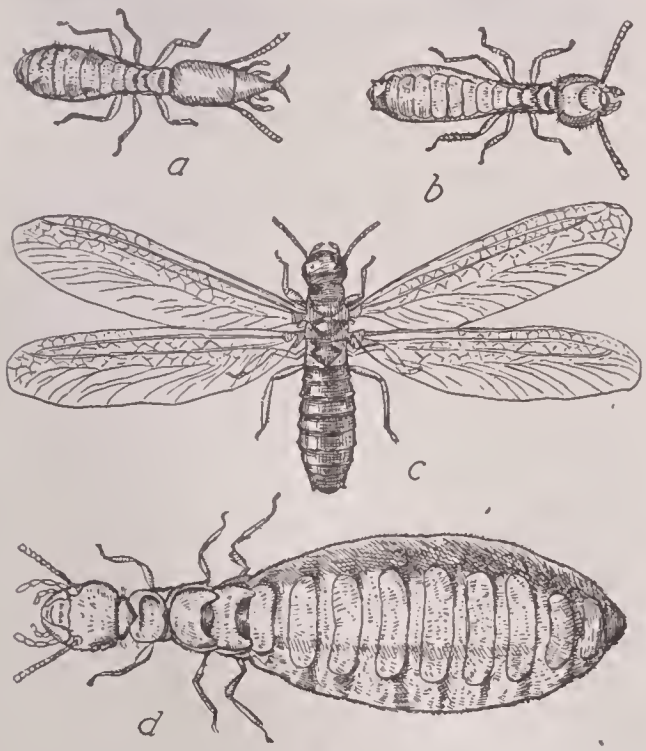
**TERMITES,** *tur'mites,* a family of insects commonly known as white ants, for they live in communities and have somewhat the appearance of ants. These two insect groups,

TERMITES' NEST IN THE TROPICS

however, belong to entirely different orders, for they are not related structurally (see INSECT, page 3000, for classification). Termites are found most abundantly in warm regions. They build huge mounds of mud, which are sometimes fifteen feet in height. The dome-shaped interior is divided into numerous chambers and galleries, and in the center is a closed-in cell where the king and queen are kept as prisoners. This royal pair constitute the perfect male and female of each colony. When they first

hatch from the eggs they have long, membranous wings, but after one flight into the air, during which the mating takes place, the wings break off at the base, and thereafter the pair are held as captives. In the cell the female undergoes an extraordinary transformation, for her body swells until it is large enough to hold many thousand eggs. As one zoölogist has expressed it, she becomes a "loathsome cylindrical package, two or three inches long, in shape like a sausage and as white as a bolster."

The eggs, deposited at the rate of several thousand a day, are borne away by the blind, wingless workers, which carry them to specially constructed cells and care for the larvae (young) as they are hatched. The workers make clay tunnels along the trunks and branches of trees, bringing back through them gums and decaying wood to feed the entire colony, and to them also falls the task of building and enlarging the nest. Another wingless class, the soldiers, have large heads and jaws and strong claws. They are supposed to defend the mound from attack. Soldiers, workers and king and queen develop from the same eggs, but scientists believe that the differences in structure result from the kind of food given the larvae. Termites are very destructive, for they tunnel their way through

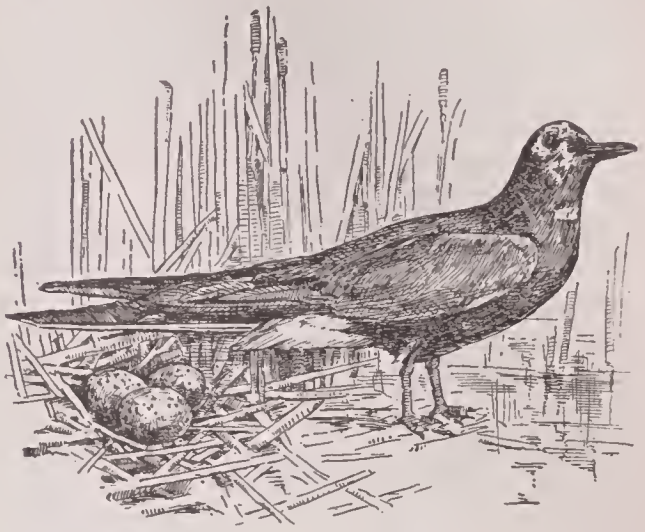



TERMITES

(*a*) Soldier; (*b*) worker; (*c*) adult male; (*d*) queen.

the woodwork of houses, destroy books and furniture, and do great damage to sugar cane and orange trees. In Central America wooden telegraph poles cannot be used because of the tunneling habits of these insects.

**TERNS,** *turnz,* a group of birds which are related to the gulls and are distinguished for their powers of flight. The fifty or more species are found in all parts of the world, ten being native to North America. They may be



TERN AND NEST

seen on seacoasts and along rivers and lakes. Terns have long, pointed bills, webbed feet, and strong, large, pointed wings, which carry them through the air swiftly and for long distances. They seize their prey, which consists of small fish, by darting quickly into the water, bill pointing downward. Great colonies of these birds may be found on islands during the nesting season. The nests are usually placed in depressions in the ground, but sometimes the eggs are laid on the bare rock.

The largest species is the *Caspian* tern, a handsome bird nearly two feet long, with a crest of shining black, and pearl-gray back and wings. The smallest is the *least* tern, nine inches long. The beautiful *common* tern, once abundant on the Atlantic coast of North America, has been almost exterminated by egg and plume hunters, but is now protected by law and is again increasing in numbers. This bird has light, pearl-gray plumage, with white tail and throat. It is about fifteen inches in length. Its eggs are three or four in number, varying in color from whitish to brownish, thickly spotted with brown and lavender. Other species are the *gull-billed, royal, sooty* and *black* terns.

**TERPSICHORE,** *turp sik' o re,* one of the nine Muses, the patron of dancing, which she is said to have originated. She is represented as a laurel-crowned virgin holding a musical instrument in her hand. See MUSES.

**TERRACE,** *ter' ays,* in physical geography the name for a line of level, elevated land along the shore of a lake or river. Several frequently occur, one above the other, like giant steps.

River terraces are formed as a result of the cutting down of flood plains. That is, as a stream forms a deeper and narrower bed, the flood plain is gradually cut away, and finally a new and lower plain is built in the old valley floor, the remnants of which rise in terraces above the new level of the river. Each of several terraces marks a period of the down-cutting process, and the highest terrace is the oldest. Rivers in the terrace stage are much older than those in the flood-plain stage. Terraces along lakes, such as those on the shores of Lake Champlain, are the marks of former shore lines, and they indicate that the volume of water is less than it once was. There are prominent terraces around most of the Great Lakes. See Flood Plain; River.

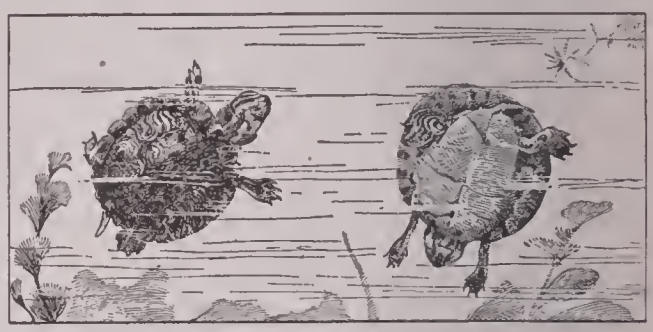
Terraces to a total of many thousand miles have been built on hillsides and mountain sides in China to provide additional land for cultivation, for in that country of 400,000,000 people every available foot of land is cultivated intensively. Like terraces are constructed by the mountain peoples of the Philippine Islands.

**TER'RA COT'TA,** a hard, durable and attractive form of earthenware, made from clay of superior quality, and used in making architectural decorations, pottery, garden vases, flowerpots, monuments, fountains, mantels, chimney pieces and similar objects. It may be produced in almost any color, but is usually a warm shade of red or a rich cream color. In the manufacture of terra cotta often clays from a number of different beds are secured. The material is weathered, ground, mixed with water, and with sand, pulverized fire brick or other vitrifying substance, tempered and then molded into the desired forms. The pieces, after being partially dried, are worked over by the finisher, and are then baked in large kilns. When a particular pattern is to be used several times, a model of the design is made, and a mold is taken into which the plastic material is forced by hand.

In some large cities the fronts of tall buildings are occasionally covered with white glazed terra cotta; such a surfacing has the advantage of being easily kept clean. Yet, notwithstanding the comparative cheapness of this substance as a building material, and its durability, lightness and resistance to heat, terra cotta is not so generally used in architecture as stone, marble, brick and granite, and its possibilities have yet to be thoroughly tested. Builders who use it must always take into consideration the fact that clay tends to shrink in drying and in firing, and in taking measurements allowance must be made for such shrinkage.

Among the ancients terra cotta was very extensively used. The Greeks and Romans employed it in making roof tiles, gutters, house ornaments, statues and statuettes, vases, tombs and coffins, imitations of metal jewelry, potters' and sculptors' molds and numerous other objects, and it also had an important place in mural decorations in relief. In Italy, in the Middle Ages, there flourished a school of terra cotta sculpture, founded by a member of the Della Robbia family (see Robbia, Della). There are valuable collections of Greek and Roman terra cottas in the Louvre, the British Museum, and in other museums of Europe.

**TERRAPIN,** *ter'a pin,* a general name loosely applied to several species of sluggish shelled reptiles, living in ponds, rivers and swamps, and more commonly called mud turtles. Although their home is in the water, where during the winter they bury themselves in the mud, they lay their eggs on land, often more than a mile from their haunts, depositing them in holes in the ground. In size these creatures vary from the *common mud turtle,* six or eight inches long, to the Southern *alligator terrapin,* which weighs from forty to one hundred pounds. Their bodies are covered with a slightly curved shell, and they have the power of drawing the feet, tail and head into this horny case. The shell, like the legs and head, is often marked with brilliant or delicate colors.



YELLOW-BELLIED TERRAPIN

The flesh of terrapin, especially of that known as the *diamond back,* is considered a table delicacy, and soup made from it is a dish "fit for the gods." The diamond-back species, which requires eighteen years to reach a suitable size, is now very rare. Commercially, male terrapin are known as *bull;* females, as *cows;* the young, little *bulls* and *heifers,* according to the sex. See Turtle; Tortoise.

**TERRE HAUTE,** *ter'e hoht',* Ind., the county seat of Vigo County, situated on the Wabash River about ten miles from the Illi-

nois state line. Indianapolis is seventy-two miles northeast, Chicago is 178 miles north and Saint Louis is 163 miles southwest. Railway transportation is provided by the Pennsylvania, the New York Central, the Chicago & Eastern Illinois and the Chicago, Terre Haute & Southeastern railroads; four interurban lines also enter the city. Terre Haute, settled in 1816 and incorporated in 1853, is one of the oldest settlements in the state. Its population was 58,157 in 1910; in 1916 it was 66,083 (Federal estimate). The area is nearly eight square miles.

The name of the city, which is the French for *high ground,* refers to its situation on a high plateau on the east side of the river. The region in which it is located has more than 400 square miles of coal lands, and immense hills of shale and clay; in some places there are alternating deposits of coal and shale. Coal is shipped from the city to points within a radius of 200 miles at the rate of about 1,500 carloads a day. Since the decline of natural gas in various parts of the state, manufacturing firms are here taking advantage of cheap fuel and fine shipping facilities, and the number of industrial plants is rapidly increasing. Four of the largest and best equipped clay-working plants in the Central West are in operation. About 1,000 people are employed in the enameling and stamping plant, and about 1,500 in the various glass works. Breweries, distilleries, malleable ironworks and foundries are other important manufactories of the city.

Terre Haute has fine schools and churches, and many noteworthy buildings. These include the county courthouse, city hall, post office, Deming Hotel, Elks' Club and Union Station. Among institutions of higher education are the Indiana State Normal School, with a fine library; Rose Polytechnic Institute, Saint Joseph's Academy and Saint Mary's-of-the-Woods College. The Emeline Fairbanks Memorial Library has 47,000 volumes. Saint Anthony's and Union hospitals and Saint Ann's and Rose orphan asylums are prominent benevolent institutions. More than fifty acres have been reserved for recreation grounds, of which Collett Park is the largest. A feature of historical interest is Fort Harrison, with its beautiful grounds, located on the Wabash River. It was built in 1810-1811 by order of Governor William Henry Harrison, later ninth President of the United States, and was under the command of Captain Zachary Taylor in 1812 (see HARRISON, WILLIAM HENRY, subhead *Governor of Indiana Territory*). G.C.N.

**TERRIER,** *ter'i er,* the general name of at least fifteen kinds of dogs originally bred and trained to drive foxes from their holes, or to dig out and kill still smaller animals, such as rats and mice. The name is taken from the Latin *terra,* meaning earth, and refers to their method of hunting. Such work demands strength, activity, grit and a very durable coat. The chief characteristics of terriers are gameness and grit; they appear to be absolutely fearless, yet are particularly affectionate and faithful.

FOUR POPULAR TERRIERS

Airedale Scotch Fox Boston

The fox and Scotch terriers are among the most popular varieties. The bull terrier, descended from the fox terrier and bulldog, is an agreeable companion, and while it possesses all the courage of the bulldog it has more intelligence and vigor. It makes an excellent watchdog, being faithful and slow to make friends.

The Airedale terrier has of recent years come into prominence and is one of the largest of the terriers, strong, active, courageous, and an excellent companion; and the Irish terrier always maintains his important rank among lovers of dogs. The Boston and the black and tan also have many admirers and make interesting and intelligent pets.

With the exception of the Scotch, the breeds mentioned above are long-legged, short-bodied, rough- or smooth-coated animals, therefore distinct from a second long-bodied, short-legged class including the Scotch, Skye, Yorkshire and

the Dandie Dinmont, together with the Shawtung (like the Skye) of Japan and the soft-haired terrier of Malta. Terriers, owing to their affectionate disposition, make delightful

"REX"
A fine specimen of bull terrier.

household pets, but their tempers depend on good treatment, and their health demands a daily walk or romp.

**TERRITORIAL EXPANSION OF THE UNITED STATES.** See article UNITED STATES, subtitle *Growth in Area and in Population.*

**TERRITORY,** *ter'i to ri,* in the United States, the name given to parts of the national domain which have not yet been formed into states. In this general sense the term has included, at various times, the following classes: (1) organized territories; (2) unorganized territories; (3) the District of Columbia; (4) insular possessions.

The government of all territories is under the direction of Congress, to whom the Constitution gives the right "to make all needful rules and regulations respecting the territory or other property belonging to the United States." The government of a territory is somewhat like that of a state, but it differs in that the authority of all territorial officials is derived from the national government. An organized territory, such as Alaska, has a governor appointed by the President, with the consent of the Senate, for four years, and a territorial legislature elected by the voters. The judges of the lower courts are also elected, but those of the higher courts are appointed by the President. In unorganized territories, there are no elected officials of any kind, all being appointed by the President, with the consent of the Senate. Thus the laws of the United States are extended to the unorganized territories, and are in fact their only laws; in an organized territory the acts of the legislature are subject to veto by Congress. There are now no unorganized territories, a measure of self-government having been granted even in the Philippines.

In the Philippine Islands, the Hawaiian Islands and Porto Rico, territorial government has been established. The District of Columbia, while usually defined as a territory, does not properly belong in that classification.

The territories have no regular Representatives in Congress; Alaska and the Hawaiian Islands, however, each send one Delegate (which see), who is assigned a seat in the House of Representatives; he may take part in debates which relate to his territory, and he may serve on committees, but he has no vote. The Philippine Islands and Porto Rico are represented in Congress by "resident commissioners," whose position is similar to that of the Delegates, except they are not assigned to committees. The territories usually send delegates to the national conventions of the great political parties.

Ordinarily, when a territory was first formed, it was *unorganized;* later, as its population grew, it was *organized.* After it had been a territory long enough to be fit, in the judgment of Congress, for statehood, it was admitted to the Union. Political considerations have usually been the important factors in determining whether or not a state should be admitted. No general rules were laid down for admission, but it was the rule that a territory should not become a state until it had enough people to entitle it to one member in the House of Representatives. Nevada, admitted in 1864, was a notable exception, for it had only 20,000 inhabitants at the time of its admission. Kansas was a territory for only four years before its admission, whereas Arizona and New Mexico waited sixty years.

For details of the government of the existing territories, see the subhead *Government* in the articles on ALASKA; HAWAII; PHILIPPINE

ISLANDS; PORTO RICO. For the government of GUAM, see that title.

**In Canada and Australia.** In the Dominion of Canada, Manitoba, Saskatchewan and Alberta were once under territorial government, and the North West Territories and Yukon Territory (which see) still have this form of administration. The government is similar to that of a territory in the United States. In Australia there is the Northern Territory, formerly a part of South Australia, but since 1911 under the jurisdiction of the Commonwealth. Papua, or British New Guinea, is also an Australian territory. W.F.Z.

**TERROR, REIGN OF.** See FRENCH REVOLUTION.

**TERRY,** ELLEN ALICIA (1848- ), one of the greatest of English actresses, was born in Coventry. Her parents were players, and they began early to train their daughter for the same career. She was but eight years old when she first appeared on the stage as Mamillius, in Shakespeare's *Winter's Tale*. For the next ten years she played minor parts in various theaters throughout Great Britain, and then retired, in 1864, to marry the celebrated English painter, G. F. Watts. A divorce soon followed, however, and in 1867 she again turned to the stage, appearing as Katharina in Shakespeare's *Taming of the Shrew*. Sir Henry Irving was the leading actor in this production, and her support of his work was gaining her wide notice when she again retired, in 1868, to marry Charles Wardell. Seven years passed before she reëntered theatrical life, and then, having once more secured a divorce, she appeared as Portia in *The Merchant of Venice,* in London. In 1878, with Irving, she played Ophelia in *Hamlet* with so much pathos and sentiment that British critics gave her extravagant praise, and Irving retained her in his company as leading woman until 1902.

ELLEN TERRY
For a generation England's most notable actress.

She made her first tour of America with him in 1883 and met with such success, especially in highly emotional parts, that she repeated the trip nearly every year. As Portia, Lady Macbeth, Desdemona, Cordelia and other Shakespearean women characters, she had few equals in pathos, daintiness and grace during the nineteenth century. Nor has her ability been confined to the older dramas. In such modern plays as *Alice-Sit-by-the-Fire,* by J. M. Barrie, and *Captain Brassbound's Conversion,* by Bernard Shaw, she has shown a remarkable grasp of modern social conditions and manners in her acting. On April 28, 1906, she celebrated her stage jubilee, the fiftieth anniversary of her first appearance as an actress, and it seemed as though all London turned out to honor her. On that occasion a purse of $40,000 was presented to her in the name of British citizens. During the next year she surprised her thousands of admirers by marrying at Pittsburgh a young American actor, James Carew. M.R.T.

Consult her own *Story of My Life;* also Hiatt's *Ellen Terry and Her Impersonations.*

**TERTIARY,** *tur'shi a ri,* **PERIOD,** a name employed formerly by geologists to designate the first period of the Cenozoic Era. *Tertiary* is applied also to the rock formations of that period. It included what under modern classification forms the Eocene, Oligocene, Miocene and Pliocene periods. The term is used somewhat less than formerly.

**Related Subjects.** For a fuller understanding of this period, the reader is referred to the following articles in these volumes:

| | |
|---|---|
| Cenozoic Era | Miocene Period |
| Eocene Period | Pliocene Period |
| Geology | |

**TERTULLIAN,** *ter tul'i an,* the first and one of the greatest of the Western Church fathers, and the creator of Latin Christian literature. He was born and educated at Carthage, North Africa, in the latter part of the second century. After reaching manhood he went to Rome, where he was converted to Christianity. After a visit to Greece and on his return to Carthage, he became absorbed in the study of works on the Christian faith and in the effort to harmonize their teachings. Coming into conflict with the laxity of the Church in the West, Tertullian withdrew from its membership and became the leader of a group of montanists, an austere sect which put much emphasis on holy living. His writings, with those of Cyprian, who put them into current language, were widely read in the Latin Church in the fourth century. Many of them are still in existence. Of these the best known is the *Apology,* a vigorous defense of Christianity.

**TESLA,** *tes'lah,* NIKOLA (1857- ), a famous electrician, the inventor of numerous

electrical devices, was born in Smiljan, in Austrian Croatia. His studies at the Gratz Polytechnic School aroused an interest in engineering and electricity, and when he went to Prague and Budapest he continued work in these, while pursuing courses in languages and philosophy. After being employed in the government telegraphic engineering department of Austria, he became an engineer in Paris, then set out for America, and for a time was under the direction of Thomas A. Edison.

For purposes of independent research Tesla established electrical laboratories in New York City, and resulting inventions have been distinguished alike for their brilliance and for their practicability. He was the first to substitute the alternating current for the direct current—a simpler and more economical method of converting electrical into mechanical energy. His principle of the rotary magnetic field is now in use in transmitting the power of Niagara Falls to near-by cities. His other inventions include improvements in dynamos, arc lights and incandescent lamps, condensers and induction coils.

**TEST ACTS,** the general name given to certain religious acts passed by the English Parliament, which were intended to prevent any but members of the Established Church from holding public office. Among the principal test acts were the Corporation Act of 1661, which decreed that all magistrates must take oaths of allegiance and supremacy, and must receive communion according to the Church of England; and the Test Act of 1673, which prescribed the same tests for the holders of public offices. These laws were repealed in 1828.

**TETANUS,** *tet'a nus,* the medical term for lockjaw (which see).

**TETRAZZINI,** *ta traht se' ne,* Luisa (1874- ), one of the greatest coloratura sopranos of the modern operatic stage, possessing a voice remarkable for its great range, and for the purity of its high staccato notes. She received her musical education in her native city, Florence, making her professional début in 1895.

TETRAZZINI

Although she attained considerable success in Italy, Russia, South America and Mexico, it is San Francisco which claims the honor of having "discovered" Tetrazzini, and of having first acclaimed her a second Patti. In 1908 she repeated her triumphs at the Metropolitan Opera House in New York, singing there the part of Violetta in *La Traviata,* and thereafter was an established favorite in grand opera and concert work in various American cities. Her repertory consists of about forty rôles, including the leading soprano parts in *Rigoletto, La Sonnambula, Lucia di Lammermoor, Lakme* and *The Cobbler and the Fairy.*

**TETZEL,** *tet'sel,* Johann (1460-1519), a German monk of the Dominican Order, famous as the opponent of Martin Luther at the beginning of the Reformation. Tetzel was born in Saxony and was educated at the University of Leipzig. Soon after his graduation he joined the Dominican brotherhood, and speedily became known as an eloquent preacher. In 1516 he appeared in the vicinity of Wittenberg, where he preached to the people concerning the granting of indulgence to those who would contribute to the fund for building Saint Peter's, at Rome. Luther's famous ninety-five theses were directed against Tetzel's methods, and they caused intense excitement throughout Germany. Tetzel himself published a series of theses answering Luther, but his course had been such as to offend the authorities of the Church, and a few months before his death he was summoned to appear before the Papal legate and was rebuked for extravagant language and improper conduct. See Reformation, The.

**TEUTONIC KNIGHTS,** *tu ton'ik nites,* one of the three great military and religious orders which was founded during the Crusades, the others being the Knights Templars and the Knights Hospitalers of Saint John. The year of its establishment was 1190; the organizers were German merchants of Bremen and Lübeck, who were moved by the sufferings of the Crusaders to found a hospital for them at Acre. Like the other orders, it consisted originally of knights or nobles only, but later admitted priests and lay brothers of lower rank. All wore the distinctive white robe with a black cross, and took the vows of poverty, chastity and obedience.

In 1225 the Teutonic Knights, having fought against the infidels in Palestine and acquired considerable land and many special privileges, undertook a crusade against the Prussians, who

were then pagans, and by 1283 had established their rule over Prussia. They held that country until 1466, then were compelled to cede West Prussia to Poland; and in 1525 the grand master of the order transformed East Prussia into a hereditary secular duchy. He also declared the order disbanded, for he himself had become a Protestant, but the loyal Catholic knights kept up the organization, the headquarters of which were at Mergentheim in Swabia. Napoleon I dissolved the order in 1809, and its possessions in various countries were confiscated by the sovereigns of the countries in which they were located. In 1840 the emperor of Austria reorganized the Teutonic Knights as an Austrian imperial order, admitting priests and sisters who in time of war are engaged in hospital and ambulance service.

**TEUTONIC RACES,** the term applied to a branch of the Aryan family. At the present time it is divided into two principal divisions; these are the Scandinavians, including the Danes, Swedes, Norwegians and Icelanders, and the Germanic, including the German-speaking people of Germany proper, Austria, Switzerland and the Netherlands, the Flemings of Belgium and the descendants of the Anglo-Saxons in Great Britain and America. See RACES OF MEN.

**TEXARKANA,** *tek sahr kan' a,* TEX., and TEXARKANA, ARK., are separate municipalities but are commercially and industrially one city. They are separated by the state boundary between Texas and Arkansas. Texarkana, Tex., is in Bowie County, and Texarkana, Ark., is the county seat of Miller County. The cities are 145 miles southwest of Little Rock, Ark., about thirty miles from the southeast corner of Oklahoma, and about the same distance from the northwest corner of Louisiana. They are served by the Kansas City Southern, the Memphis, Dallas & Gulf, the Saint Louis, Iron Mountain & Southern, the Saint Louis Southwestern and the Texas & Pacific railroads. The population of Texarkana in Arkansas was 5,655 in 1910. In 1910 Texarkana in Texas had 9,790 inhabitants; in 1916 the population of the latter was 12,640 (Federal estimate).

Prominent features are the Federal post office, which is built across the state boundary and lies in both cities, two city halls, the Miller County courthouse and jail, the railroad hospital, which cost $200,000, sanitariums, churches and Saint Agnes Academy. There is a good export trade in lumber and cotton, cottonseed oil and hides. Important industrial establishments include various plants connected with the cotton industry, railroad shops, furniture and pottery factories, lumber mills and machine shops. Both places were settled in 1873, and both were incorporated as cities in 1887.

**TEXAS,** one of the south-central states and the largest commonwealth in the American Union. It is no longer a lonely plain, but, rich in natural resources, it is to-day a progressive and a prosperous state. Unlike any other state, it was an independent republic when admitted into the Union (see subtitle *History,* below). It was named for the Texas Indians, who occupied part of the territory; *friends* is given as the most probable meaning of the name. Texas is popularly known as the LONE STAR STATE, because of the single star in the flag of the republic. The bluebonnet is the state flower.

**Size and Location.** Having an area of 265,896 square miles, Texas is larger than the states of Michigan, Wisconsin, Iowa, Illinois and Indiana combined. It is nearly six times the size of the state of New York and about 10,000 square miles larger than the province of Alberta. Point Isabel on the Gulf coast, and Texline, a town on the Texas-New Mexico border, are 1,107 miles apart, and this distance is 200 miles more than the shortest rail route between Chicago and New York. The city of El Paso in Western Texas lies at a greater distance from Texarkana than does the city of Chicago, and

one can travel almost as far within the state as in making the journey from Texarkana to the Atlantic coast.

With the exception of Florida, Texas is the southernmost state in the Union; it is midway between the Arctic Circle and the equator, and equidistant from the Atlantic and Pacific oceans. There are 3,495 square miles of water in the state; its irregular boundaries are largely formed by rivers, and on the southeast lies the Gulf of Mexico.

**The People.** As Texas is one of the younger states, its population is not yet large enough fully to develop its wonderful resources. Having 3,896,542 inhabitants—fewer than live in the city of New York—at the census of 1910, it ranked fifth in population among the states of the Union. The average density of the population was 14.8, as compared with 30.9, the average for the entire United States. However, the number of inhabitants is steadily growing, and the population was estimated at 4,472,494 on January 1, 1917, showing an increase of over sixteen per cent since 1910. There are more than 690,000 negroes in the state, and of foreigners the Mexicans are most numerous. In the south and west of Texas a large part of the labor on the farms and ranches is done by Mexicans.

All but twenty-four per cent of the population live in rural communities. The largest cities are San Antonio and Dallas, each having over 110,000 inhabitants; Fort Worth, Houston, El Paso, Galveston, Austin, Waco, Beaumont and Laredo.

The largest religious bodies are the Baptist and Methodist. The Roman Catholic, Disciples of Christ, Presbyterian and Episcopalian denominations are also important.

**Education.** Texas has an excellent system of public schools, under the supervision of the state superintendent of public instruction and a board of education consisting of the governor, comptroller, secretary of state and the state superintendent. County schools are administered by county boards and commissioners; city schools are regulated by municipal boards of education. In 1915 three assistant superintendents were appointed, an appropriation was made for the purpose of establishing departments of vocational training in the high schools, and education was made compulsory. In 1910 the illiteracy of the state was 9.9 per cent, which is small, considering the large number of Mexicans and negroes. Factories may not legally employ illiterate children under fourteen years of age.

Texas has a permanent school fund of $83,900,000, which is larger than that of any other state in the Union. Separate schools are maintained for the white and negro pupils, but the Mexicans attend the schools for the white children. Besides the elementary and high schools, the state maintains normal schools at Canyon City, Huntsville, Denton and San Marcos; a school of industrial arts at Denton; a normal and industrial college for the colored at Prairie View; the state university at Austin, with a medical department at Galveston, and an agricultural and mechanical college at College Station. Other prominent institutions of higher education are Southwestern University at Georgetown (Methodist); Texas Christian University at Fort Worth; Baylor University at Waco (Baptist); Trinity University at Waxahachie (Presbyterian); and the University of Dallas at Dallas.

Texas has been conspicuous among the Southern states in its provision for the scientific care of dependents and defectives. In 1915 this state was added to the short list of those in which provision is made for the care of crippled and deformed children, and the Walter Colquitt Memorial Children's Hospital was taken over by the state. Other state institutions of charity and correction are insane asylums at Austin, Terrell and San Antonio; an orphans' home at Corsicana; an epileptic colony at Abilene; a school for the deaf and dumb, homes for Confederate soldiers and Confederate women and an institution for the colored deaf, dumb and blind at Austin; a girls' training school at Gainesville; a juvenile training school at Gatesville, and penitentiaries at Huntsville and Rusk. Each of these institutions is controlled by its own superintendent and board of managers, who are appointed by the governor. The honor system and some form of profit-sharing labor have been established in recent years, in common with other states, in the penitentiaries.

## *Physical Characteristics and Resources*

**The Land.** Texas consists of several vast plains sloping from the mountainous table-land in the northwest to the low, marshy shores of the Gulf of Mexico. The northeastern section is an undulating timberland where there are dense forests of pine and impenetrable thickets

of hawthorn, holly and magnolia trees, filled with the notes of the mocking bird, the most common song bird of the state. In the southeastern section, the lowlands and flat prairies, extending westward from the coast, rise gradually to low hills which in the west become high and rugged.

The great Black and Grand prairies of the east-central section are the finest agricultural regions in the state. Toward the west these prairies become broken and rise to meet the Great Plains, a vast, treeless table-land, rising in a series of steppes from an elevation of 700 feet to the mountains west of the Pecos River. The northern part of this section, known as the *Llano Estacado,* or Staked Plain, extends into New Mexico.

West of the Pecos River the elevated plains of gama and buffalo grass are crossed by four spurs of the Rocky Mountains. These lofty masses, locally known as "lost mountains," do not form continuous ranges. There are several peaks over 8,000 feet in altitude. Except for growths of yucca and mesquite, the lower slopes of the mountains are bare of trees, but their summits are clothed with dense forests.

The entire Texas coast is bordered by long sandbars or islands which enclose shallow coast lagoons. Padre Island, the largest of these bars, is 100 miles long and is the most noted island of its kind in the world. Others are Galveston, on which the city of the same name is situated, Matagorda, Saint Joseph and Mustang islands. There are several shallow bays, including those of Galveston, Matagorda, Corpus Christi and San Antonio, in the deepening and dredging of which the government annually spends many thousands of dollars.

**Rivers and Lakes.** All of the forty-four rivers of the state except the Red and the Canadian, which empty into the Mississippi, belong to the Texas system, and all but the Rio Grande and its tributary, the Pecos, which rise in the mountains of Colorado and New Mexico, have their sources in the Texas table-land or plains. The rivers have a general southeast course and empty into the Gulf of Mexico. In the west the streams are swift and clear, but near the coast they become sluggish and muddy, and their channels are often obstructed by sandbars.

The Rio Grande for most of its length of 1,800 miles forms the boundary between Texas and Mexico. In times of high water it is navigable as far as Rio Grande City. Its principal tributary is the Pecos, which flows south across the western parts of the state. The most important river is the Brazos, which flows for 900 miles through the richest and most developed section in the state and is navigable forty miles from the Gulf at all seasons of the year. The Red River, rising in the Great Plains, forms part of the northern boundary, and the eastern boundary is formed in part by the Sabine (called by the Mexicans *Sabinas,* meaning *cypress*), which flows south to the Gulf, through dismal, moss-hung cypress swamps. The Colorado, fed by the Concho, San Saba, Llano and smaller streams, cuts its way through beautiful deep canyons and empties into Matagorda Bay. Other rivers of importance are the Neches, Guadalupe, Trinity, San Mario, San Antonio and Nueces.

OUTLINE MAP OF TEXAS

Showing boundaries, navigable rivers, chief cities, locations of mineral wealth and the highest point of land in the state.

Texas has no large bodies of water, but there are many small, fresh-water lakes in the coastal plain, among which are Grand, Clear and Sabinas lakes. Caddo Lake lies on the Louisiana border, and salt ponds are found near the mouth of the Rio Grande, in the Llano Estacado and the Trans-Pecos region.

**Climate.** Within the vast bounds of Texas the climate ranges from the moderately temperate to the subtropical. Along the southeast coast the country is low and the climate warm; in the northeast it is low and damp but cool; in the central and western regions it is high, dry and cool. As one leaves the coast and passes through the prairies and plains to the western mountains, the climate grows uniformly cooler, the temperature ranging from 73° on the Lower

Rio Grande to 56° in the "Panhandle," the northwest corner between New Mexico and Oklahoma. The Gulf winds temper the heat of summer and modify the winter cold, and the mild, delightful winters of Southern Texas have made that section a popular winter resort. During the winter months occasionally there are disagreeable northwest winds called *northers*, accompanied by sleet and heavy rains. See NORTHER.

The rainfall is heaviest in the northeastern sections, where it averages from fifty to sixty inches a year. The precipitation decreases toward the south and west, and in the extreme western part of the state the annual average is only ten to twenty inches. Irrigation is necessary throughout the western and west-central sections. On the coast the autumn months are wettest, but in the north the spring is the rainy season.

**Agriculture.** The great fertile area of Texas makes it one of the most important agricultural states in the Union, even though its vast resources and possibilities are still far from their full development. It is surpassed only by Illinois and Iowa in the value of crops. There are in the state over 112,500,000 acres of cultivated land, an area equaled in no other state, and there is scarcely any known crop of the temperate zone that cannot be raised somewhere within the boundaries of Texas.

The chief crop is cotton, which is most extensively grown in the coastal plain and central and northern prairies. In 1916 the crop was 3,775,000 bales, valued at $350,796,000, and Texas has for some years ranked first among the states in the production of both cotton and cottonseed.

The cultivation of rice has become an important industry along the coast, where the fields are flooded by water pumped from the lagoons and streams. The rice fields embrace an area as large as the state of South Carolina, and they yield a crop second only to that of Louisiana. The fertile valleys of the lower Brazos, Trinity, Colorado and Guadalupe rivers are among the finest sugar regions in the United States, and Texas follows Louisiana and Georgia in the production of sugar cane. Among the cereals corn is the most important crop. Texas is also one of the leading corn states of the Union, and it produces more kafir corn than any other state. The corn crop was 131,100,000 bushels in 1916, according to United States government estimates. The state also produces large crops of wheat, oats, rye, barley, alfalfa, hay, tobacco and potatoes. Truck gardening is important, and large quantities of vegetables are shipped to Northern markets. The fruit of Texas, especially the Elberta peach, is noted for its excellent quality. In 1915 the peach crop was valued at $3,680,000. Apples, pears, plums and grapes are also grown, and in the production of figs and in nursery products Texas is one of the leading states in the Union.

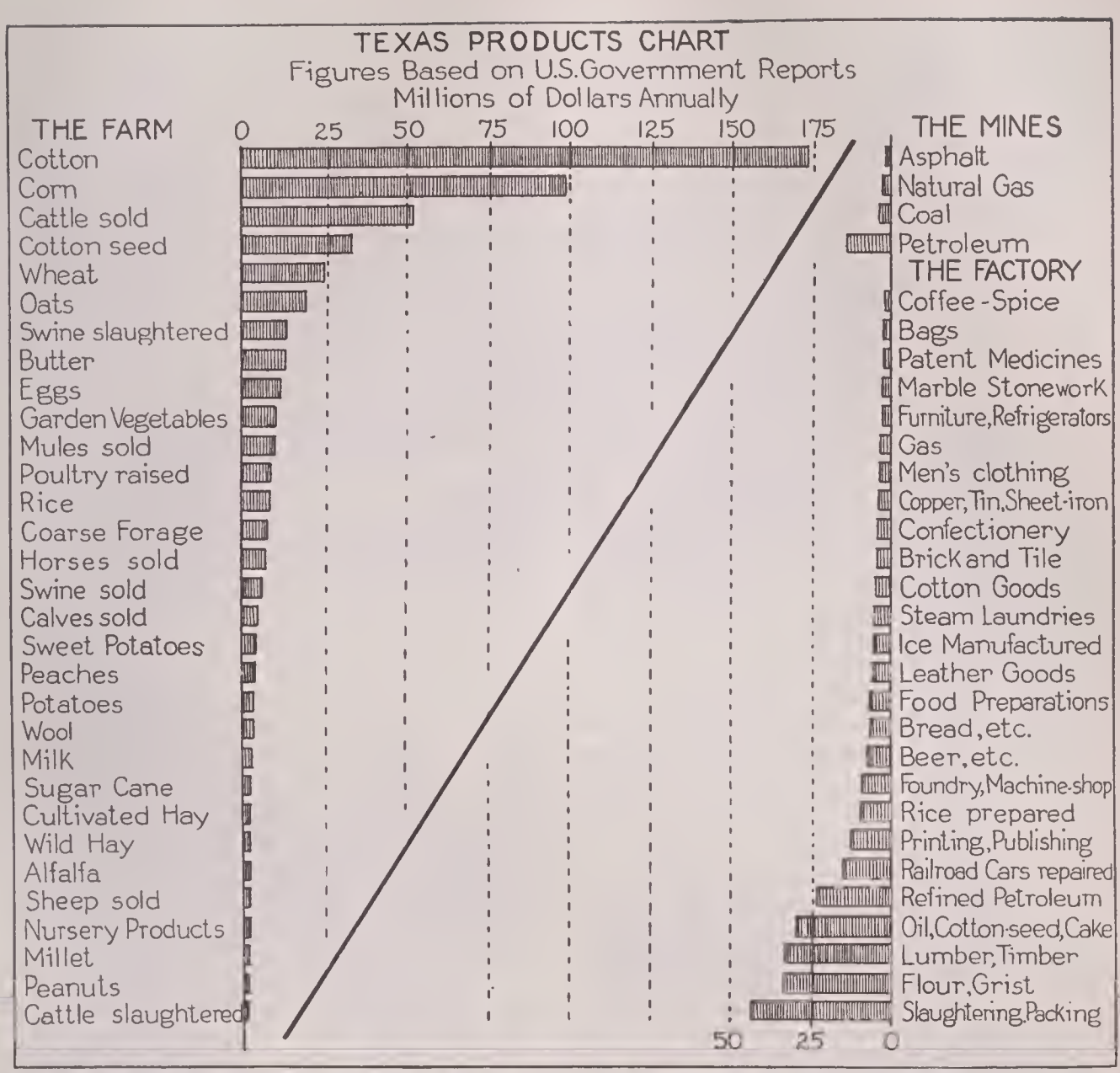
**The Cattle Ranches.** The nutritious grasses of the far-reaching plains furnish pasturage for immense herds and flocks, and in the number and extent of cattle ranches Texas surpasses all of the other states. The live stock in the state in January, 1916, was valued at more than $400,000,000. Much of the live stock is slaughtered in Texas, but large shipments are also sent to the packing centers at Kansas City, Saint Louis and Chicago.

**Irrigation.** Under an irrigation law of 1913, Texas was divided into three water divisions, and a board of engineers was created to have charge of the water resources of the state. The arid region along the Upper Rio Grande is included in the Texas-New Mexico Federal reclamation project, and there are over 28,400 acres watered by this system. The Lower Rio Grande and the numerous artesian wells of the south and east-central region furnish water for many private irrigation systems.

**Forests.** One of the chief sources of the great wealth of Texas is its timber. The yellow pine, which is the most important timber of the United States, is the principal lumber product. Hard woods are found along the western edge of the dense pine forests; dark cypress swamps border the Trinity, Neches and Sabine rivers, and groves of pecan, walnut and other nut bearers are also found along the eastern streams. The stunted blackjack of the east-central region and the gnarled mesquite of the western plains are used extensively for firewood. In the value of timber products, Texas ranks fifth among the states. In 1915 the state provided for the appointment of a state forester and board of forestry, and also for the purchase of forest reserves and coöperation with the Federal government in forest-fire protection.

**Fisheries.** Oysters, clams and shrimp abound in the shallow waters along the coast. The oyster culture in Matagorda Bay is under state supervision and is of special importance. The redfish caught in the deeper waters of the Gulf are also one of the important fisheries products.

**Minerals.** The mineral resources of the state are being developed rapidly, but the produc-




tion still falls far short of the possible output. There are extensive fields of bituminous and lignite coal in the north and east-central sections, and also a large field along the Rio Grande, between Laredo and Eagle Pass. They cover a total area of over 63,000 square miles and have an estimated available supply of 30,960,000,000 short tons. There are beds of a very pure iron ore in the east and central mineral belts, and also in the mountainous region west of the Pecos River.

One of the newest and the most important of the mineral industries is the production of petroleum. Oil was first discovered in the Corsicana field in 1894, and since that time the number of wells has steadily increased. The production in 1914 exceeded all previous records and showed an increase of thirty-four per cent over that of the preceding year. In 1915 Texas was outranked by only three states, California, Oklahoma and Illinois, in the output of petroleum. Both illuminating oil and that used for fuel are produced. The Spindle Top oil field, near Beaumont, is famous for its spouting wells, locally known as "gushers," which produce from 25,000 to 50,000 barrels a day. Closely associated with this industry is the production of natural gas, in which Texas ranks eighth among the states. The production of cement is the industry next in importance. The state stands high in this product, and also in the output of asphalt and quicksilver. Large deposits of salt and a very pure gypsum are found in the north; gold, silver, copper, lead and zinc are mined in the western mountains; an extensive field of cinnabar lies along the Rio Grande in the west, and clay and building stones, including sandstone, limestone, granite and marble, are found in many counties.

Texas has an abundant supply of artesian and mineral waters. The artesian belt, one of

the largest in the world, embraces an area of 120,000 square miles, and many of the chief cities in the eastern part of the state, including Galveston, Houston, Dallas and Waco, derive their water supply from it. Some of the mineral waters are hot and have valuable medicinal properties. Among the most noted springs and wells near which great health resorts have been established are Mineral Wells, Wooten Wells, Sour Lake Mineral Springs, Marlin Hot Wells, Palo Pinto Crystal Wells and Lampasas Springs. The annual value of the mineral products of the state exceeds $30,300,000.

**Manufactures.** Although Texas is chiefly an agricultural and stock-raising state, the abundance of raw materials and the plentiful supply of cheap fuel from the local coal and oil fields are rapidly developing large manufacturing industries. The most important of these are slaughtering and meat packing and the milling of lumber and flour. Texas manufactures more cottonseed oil and cake than any other state in the Union, and is surpassed only by Pennsylvania in the manufacture of ice and by Louisiana in the refining of sugar, making of molasses and cleaning and polishing of rice. Car repairs and foundry work, the manufacture of brick and tile and the canning of fruits and vegetables are other important industries.

**Transportation and Commerce.** Truly a vast railroad system would be required to furnish adequate transportation in all parts of this state of magnificent distances. Although Texas has a greater railroad mileage than any other state in the Union, many of the southern coast counties and sections of the extreme west and northwest are still without railroad accommodations. There are, however, over 15,700 miles of railroad in the state, and the construction of new branches and spurs is steadily progressing. Two trunk lines cross Texas from east to west en route to the Pacific coast, and two lines extending from the northeast to the southwest corners of the state reach into Mexico. Facilities for transportation in the northeast and central parts of the state are excellent. The most important roads include the Galveston, Harrisburg & San Antonio; the Missouri, Kansas & Texas; the International & Great Northern, and the Texas & Pacific. The chief railway centers are El Paso, the terminus of seven railroads, Houston, Galveston, Fort Worth, Dallas, Greenville and Waco. There are over 900 miles of interurban electric railway and ninety miles of interurban railroad run by gasoline power. Of the public roads, which cover 128,900 miles, 9,700 miles are surfaced.

Galveston is by far the chief cotton-shipping port of the United States, and, with the exception of New York and New Orleans, the most important commercial port of the country for exports and imports.

## *Government and History*

**Government.** Texas is governed under the constitution of 1876, which is the fourth adopted since the admission of the state, the others being those of 1845, 1866 and 1868. All male citizens and aliens who have declared their intention of becoming citizens, who have lived in the state one year and in the county six months immediately preceding the election, except paupers, criminals, defectives, soldiers, sailors and persons who have taken part in a duel, are entitled to vote. An amendment may be proposed by two-thirds of the members of each house of the legislature, and it becomes effective if approved by a majority of the voters.

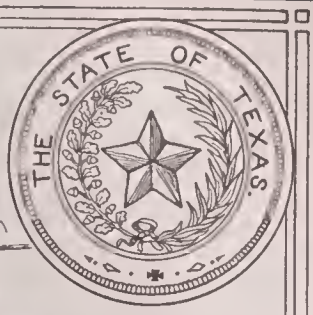
The *executive* power is vested in a governor, lieutenant-governor, secretary of state, comptroller, treasurer, attorney-general and commissioner of the general land office. There is an unusual provision that the secretary of state shall be appointed by the governor, but all other state officials are elected by the people for terms of two years. A surviving trace of the government of the Texan republic is seen in the extensive powers of the governor, who has, in addition to the usual privileges of the state executive, an extensive power of appointment and the power of veto over the separate items in appropriation bills. A two-thirds vote in each house is necessary to pass over his veto.

The *legislative* department consists of a senate of thirty-one members, elected for four years, and a house of representatives whose membership cannot exceed 150. Representatives are elected for two years. Bills for raising revenue must originate in the lower house, but may be rejected or amended by the senate. The legislature meets biennially, and the governor may call special sessions.

The *judicial* department consists of a supreme court, a court of criminal appeals and a court of civil appeals, each having three judges elected for six years; district courts, having one judge elected for four years; county courts;

# TEXAS

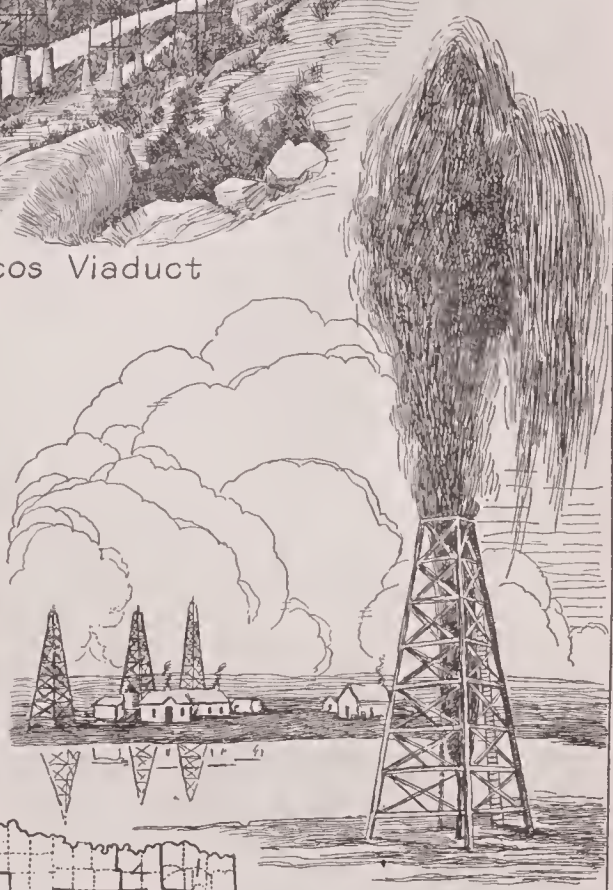
State Flower



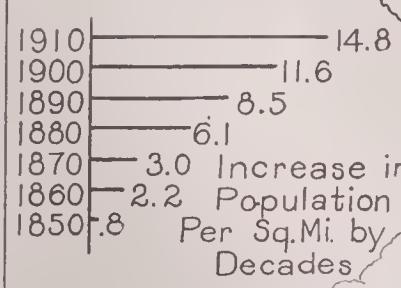

State Seal

The Great Pecos Viaduct

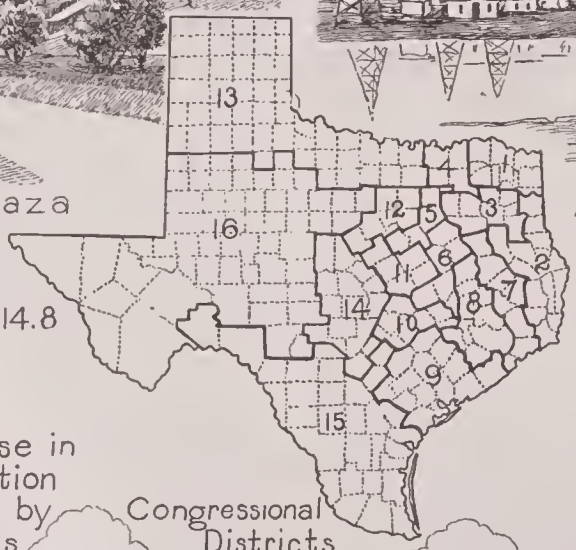
In the Alamo Plaza



A Gushing Oil Well

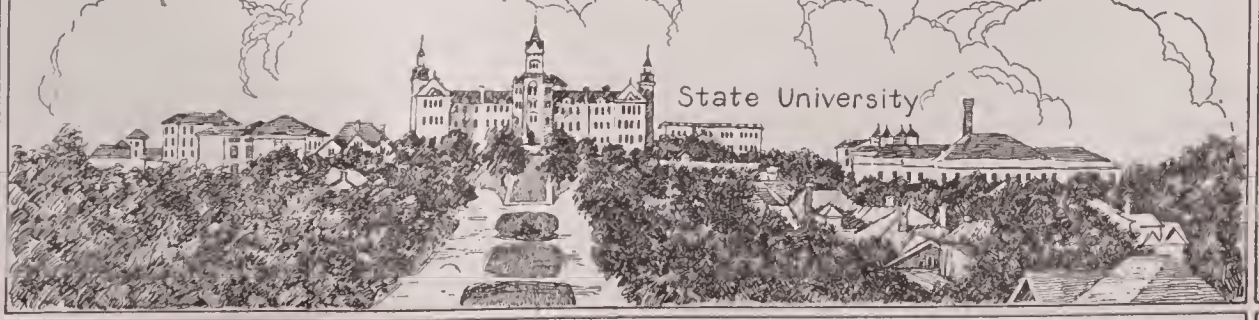



Increase in Population Per Sq. Mi. by Decades




Congressional Districts

Religions



State University

commissioners' courts, and justices of the peace. In the judicial system there are many traces of the old Spanish government in Texas.

The county is the unit of local government. The commission form of government originated in Texas, and has been widely adopted in the state. Atheists are excluded from all offices. In 1907 local option was established; in 1918 statewide prohibition became effective. Workmen's compensation acts, labor laws and other progressive measures have been passed.

**Exploration and Settlement.** The history of Texas reflects the struggle between the Spanish, French and English for the possession of America. The earliest explorations were made by the Spanish, soon after the conquest of Mexico. In 1540 Coronado, in search of the famous Seven Golden Cities of Cibola, reached Ysleta, a Pueblo village on the Rio Grande. Two years later De Soto reached Texarkana, and in 1582 Espejo established a mission at El Paso. Upon these explorations Spain based its claims to the region north of the Rio Grande. The French entered into the contest for the possession of the territory when La Salle, in 1685, founded a colony on the shores of Matagorda Bay, and from 1712 to 1803 Texas was alternately under the control of France and Spain.

After the purchase of the Louisiana Territory from France in 1803, the United States claimed the territory to the Rio Grande, but in 1819, in the agreement with Spain whereby Florida was acquired, the claim was abandoned, and the Sabinas was made the southern boundary of the United States.

**Americanization and Struggle for Independence.** In 1821 Mexico gained its independence from Spain and Texas became a province of Mexico. The Americanization of Texas began in the following year, when Stephen F. Austin led a great immigration of United States citizens to Texas. By 1830 over 20,000 Americans had settled in the province, and Mexico not only forbade further immigration but began to persecute the American settlers. The Texans took up arms to defend themselves, and on March 2, 1836, the inhabitants of the province declared it a free and independent republic. On March 6 occurred the memorable Battle of the Alamo at San Antonio, where all of the Americans who had taken refuge in the old Spanish mission were killed. On April 21, 1836, Santa Anna, the Mexican President and general, was overwhelmingly defeated at San Jacinto by a small force of Texans under General Sam Houston. The independent government of Texas was then established, with General Houston as President.

**Statehood.** Afer a long controversy over the slavery question, Texas was admitted to the Union in March, 1845, on the conditions that the state should retain its unappropriated and vacant land; that new states not to exceed four in number might be formed within its boundaries; that the United States settle all questions of boundary with foreign countries. This last provision brought about a second war with Mexico in 1846 (see MEXICAN WAR). By the treaty of Guadalupe Hidalgo, February 2, 1848, the Rio Grande was definitely fixed as the southern boundary of the state.

In spite of strong Union sentiment, Texas joined the Confederacy and furnished 90,000 troops to the Southern armies. A new constitution abolishing slavery and renouncing states' rights was adopted in 1866, but it was not acceptable to Congress, and in 1867 Texas was placed under military government. Another constitution was adopted in 1869, and the following year the state was readmitted into the Union.

The growth and prosperity of the state have been remarkable, especially during the last twenty years. In 1900 much of Galveston was destroyed by a tidal wave, but the city has since been made safe by raising its level and by the construction of a great sea wall and a causeway between the island and the mainland. Disastrous river floods caused much loss of life and property in 1913. The public warehouse system for the storage of cotton was established in 1914 to relieve the critical cotton situation. In 1915 a resolution was introduced in the legislature providing for the creation of a new state to be called "Jefferson," in the northwest corner of Texas. As yet no definite action has been taken upon this matter. The adoption of woman suffrage was defeated in the legislature in the same year.

**Other Items of Interest.** On the Llano Estacado the air is so clear and dry that it is almost impossible to estimate distances. A man may set out to walk to a point which is apparently not more than five or six miles away, only to find hours afterward that it is still a score of miles distant. Mirages are of frequent occurrence.

Galveston, Texas, is often known as the "oleander city," for practically every yard and garden displays those beautiful flower-laden shrubs.

# *RESEARCH QUESTIONS ON TEXAS*

**(An Outline suitable for Texas will be found with the article "State.")**

What are the "lost mountains" of Texas? What reason can you see for their being so called?

How does the highest point in Texas compare in altitude with the highest point in each of the bordering states?

Mention one important crop in the production of which Texas ranks first, one in which it ranks second, and one in which it ranks third.

How does the state compare with others in the extent of its artesian-well belt? What is the principle on which such a well operates? (See ARTESIAN WELL.)

What conditions laid down when Texas was admitted to the Union brought on war between the United States and Mexico? How?

Compare the cotton production of Texas with that of the chief cotton-growing countries with the exception of the United States?

Where is the Llano Estacado, and what is one of its peculiarities?

What are the "gushers," and where are they to be found? How does Texas rank among the states in the output from these gushers? How does it compare in amount produced with the leading states?

What and where is the Alamo, and what part did it play in the history of Texas?

Why is it a natural thing that every loyal Texan should revere the memory of Sam Houston?

How does the largest state in the Union compare in number of inhabitants with the largest city in the Union?

How many states surpass Texas in value of total crops?

How does the area of the coal fields of this state compare with the total area of each of the five chief coal-producing states? (See COAL.)

What two famous explorers of early times reached the territory now comprising Texas? For what was each searching?

What is the "Panhandle" of Texas?

How many constitutions has Texas had? When was the present one adopted?

Of what city is it said "If you want to die here you must go somewhere else," and what is referred to?

How does the largest state in the Union compare in size with the most populous? How do the two compare in population?

Which river of Texas is most important commercially, and which is most important historically?

How does the state rank in total railway mileage among the states of the Union?

What is the mileage to each hundred square miles of area?

What is the popular name of the state? Account for its origin?

How many rivers has Texas?

What does the name *Texas* mean, according to most authorities?

How does Texas compare in number and extent of cattle ranches with the other states of the Union?

Mention one manufactured product in which Texas ranks first and two in which it ranks second.

How is it possible that the United States may some time have forty-nine states, without enlarging its present boundaries?

What is the state flower?

Texarkana, as its name would indicate, is partially in Texas and partially in Arkansas.

The last fight in the War of Secession took place in Western Texas on May 13, 1865.

The climate in San Antonio and its environs is so healthful that it has given rise among the inhabitants to the saying "If you want to die here you must go somewhere else."

Not far from El Paso there is a cave which is carefully avoided by the Indians, because they believe it to be haunted by the ghosts of the Apaches, a band of whom were driven into this cave by their enemies and kept there until they starved. Unexplainable noises are to be heard in various parts of the cave.

The inhabitants of Houston call the people of Galveston "land crabs," and the latter retaliate by calling the former "mud turtles." E.B.P.

Consult Brady's *Conquest of the Southwest;* Davis's *Under Six Flags;* Lubbock's *Six Decades in Texas.*

**Related Subjects.** The reader who desires more detailed information with reference to Texas may consult the following articles in these volumes:

CITIES

| | |
|---|---|
| Abilene | Houston |
| Amarillo | Laredo |
| Austin | Marshall |
| Beaumont | Palestine |
| Brownsville | Paris |
| Cleburne | San Angelo |
| Corpus Christi | San Antonio |
| Corsicana | Sherman |
| Dallas | Temple |
| Denison | Texarkana |
| El Paso | Tyler |
| Fort Worth | Waco |
| Galveston | Wichita Falls |
| Greenville | |

HISTORY

| | |
|---|---|
| Alamo | Houston, Sam |
| Guadalupe Hidalgo, Treaty of | Louisiana Purchase |
| | Mexican War |

LEADING PRODUCTS

| | |
|---|---|
| Corn | Peach |
| Cotton | Petroleum |
| Cottonseed Oil | Pine |
| Kafir Corn | Rice |
| Lumber | Sugar |
| Mule | |

RIVERS

| | |
|---|---|
| Brazos | Red |
| Canadian | Rio Grande |
| Colorado | Sabine |
| Pecos | |

**TEXAS,** UNIVERSITY OF, a state university at Austin, founded in 1876, when the state legislature made a land grant of 1,000,000 acres. In 1883, when the institution first began sessions, it received a grant of another million acres. Federal land grants were never a part of the endowment of the University of Texas. The university is organized into the colleges of arts, literature, science, law, engineering, education and medicine. Recently a department of journalism was added. The department of medicine is located at Galveston, and in connection with it are the school of pharmacy and the John Sealey Hospital. The university also conducts extension courses, which have grown steadily in popularity and have been of great benefit to the teachers of Texas. The university has a faculty of nearly 200 instructors, and the student enrollment is over 2,700. The library contains about 123,000 volumes.

**TEXTILE,** *teks'til,* a woven fabric, the name being derived from the Latin *textilis,* meaning "woven." In general use *textile* is an all-inclusive term for woven goods and articles made from them, divided into a number of groups: cotton goods of all kinds; woolens, worsteds and felt goods; carpets and rugs; hosiery and other knit goods; silks; linen, jute, cordage and twine. The details of the processes by which all these varieties of textiles are made are given elsewhere.

**Textile Industry.** All of these textile products have been manufactured for hundreds of years, but it is only since 1800 that the manufacture of textiles may be called a separate industry. Once it was customary for each household to produce most of the things it needed. The mother frequently spun the woolen yarn, wove it into cloth, and made the cloth into clothes. Later in the household system, certain families and certain sections devoted their time to the making of cloth, all the work being done at home. These goods they sold at annual fairs, or to a middleman who traveled from house to house to make his purchases.

A further advance took place when a number of workmen assembled in a single house and worked for wages; this was the custom in English carding and fulling mills long before the end of the eighteenth century. Between 1750 and 1800 came the inventions of Arkwright, Hargreaves and others, destined to revolutionize the textile industry. It was the first to adopt the typical factory form of organization, which it has retained and developed to this day. It is a curious fact, however, that in at least one branch of the textile industry the household form has persisted in spite of the growth of factories. In the manufacture of ready-made clothing the sweatshop still has its place, although it is slowly disappearing.

**Importance of the Industry.** Textiles are made primarily for clothing, and have always been one of the leading classes of manufactures. In the United States the value of the products of all the allied textile industries is exceeded only by that of the iron and steel industry, in Canada only by that of foodstuffs, and in Great Britain and Ireland the products of the textile industry are greater than those of any other group. In the United Kingdom nearly 600,000 people are directly employed in the manufacture of textiles, and the number dependent, directly or indirectly, on the industry is seven or eight times as great. The annual output exceeds a value of $1,000,000,000. The textile industry of the United States employs nearly 1,000,000 people and has an annual output of $1,500,000,000 to $1,750,000,000. Beside these huge amounts the Canadian industry, with an average output of $150,000,000, is comparatively small.

**Textiles in the Schools.** The study of textiles in schools is of a double character. The child, and particularly the girl, in the elementary and secondary schools studies them chiefly from the viewpoint of the household arts or domestic economy. The technical processes of textile manufacture, on the other hand, belong more specially to industrial education. As yet the work in both branches has advanced little beyond the experimental stage. In many European countries, notably Great Britain and Ireland, Germany, Belgium, France, Norway and Sweden, training in all household arts has for many years been a recognized feature of the school system. In the United States and Canada the value of such training is being everywhere recognized, and courses are being instituted in schools and colleges; even if the work is elective and not required the entire field can be covered with degrees of thoroughness varying with the amount of time devoted to it.

The study of textiles is a branch of social science—in other words, one of those subjects which are designed to make children better fitted for daily life. The study of primitive textiles involves some study of the beginnings of civilization, for the barbarian hardly ever knew how to weave. The textile arts are then to be considered in their relation to the broad questions of clothing and shelter, and such other practical points as modern methods of manufacture, varieties of textiles, their value for various purposes and their prices. The adulteration of textiles is also an important point. The functions of textiles—that is, clothing—in health, beauty and ethics is a phase of the subject too difficult for young children, but even in elementary schools the care and repair of the wardrobe should be easily understood. Children in the higher grades and in secondary schools are capable of making many articles of clothing, and frequently of designing garments and household furniture.

In the ordinary school course textiles are studied from the standpoint of utility. To some extent this viewpoint is preserved in technical education, but the emphasis is laid on methods of manufacture. In the United States, for example, there are a number of schools, supported largely by large textile manufacturers and partly by the state, which turn out each year hundreds of skilled workmen familiar with the processes of manufacture and able to hold important positions in the mills. Noteworthy examples of such an institution are the Textile School at Philadelphia, and the schools at Fall River, New Bedford and Lowell, three great cloth-making centers in Massachusetts. The Pratt Institute at Brooklyn (N. Y.) and the Lewis Institute at Chicago offer similar courses. The more advanced work includes microscopic and chemical tests of the different fibers, dyeing and weaving, and pattern designing, besides the artistic and economic aspects of the industry. Many schools also offer normal courses for teachers. W.F.Z.

Consult Watson's *Textile Design and Color*; Barker's *Textiles;* Dooley's *Textiles for Commercial, Industrial and Domestic Art Schools.*

**Related Subjects.** Matter supplementary to this discussion of textiles may be found in the following articles in these volumes:

| | |
|---|---|
| Broadcloth | Gauze |
| Brocade | Hemp |
| Calico and Calico Printing | Jute |
| | Linen |
| Cambric | Mohair |
| Canvas | Muslin |
| Chiffon | Plush |
| Cloth | Satin |
| Corduroy | Shoddy |
| Cotton | Silk |
| Crape | Taffeta |
| Cretonne | Tapestry |
| Crinoline | Tartan |
| Damask | Tweeds |
| Dimity | Velvet |
| Felt | Weaving |
| Flannel | Wool |
| Flax | Worsted |

**THACKERAY,** *thak'er i,* WILLIAM MAKEPEACE (1811-1863), one of the three most celebrated English novelists of the English Victorian Age. He was born July 18, 1811, in Calcut-

ta, where his father was in the employ of the East India Company. He was sent, while still very young, to England to be educated. He spent several years at the Charterhouse School, which he afterward described in *The Newcomes,* and passed a year at Cambridge, where Tennyson was at the same time. His well-known humorous verses on *Timbuctoo* were written on the topic assigned for the year's prize poem, but were not intended as a burlesque of Tennyson's poem, which won the prize. An interval of travel on the continent followed, and then he settled down for a short time to study law—a subject, however, which failed to interest him.

WILLIAM MAKEPEACE THACKERAY

Of himself he said, "I have no brains above my eyes; I describe what I see." He gave the world a true picture of the society of his day.

**From Art to Literature.** In 1832 he came into possession of a considerable fortune, which was soon greatly lessened by the failure of an Indian bank and by an unfortunate investment. From his boyhood days he had been fond of drawing, like his own Clive in *The Newcomes,* and he went to Paris to study art; but he was soon convinced that he would never be successful enough at it to earn his living, which he now found himself obliged to do. He began, therefore, to write humorous tales and sketches, which were contributed largely to *Fraser's Magazine* and to *Punch.* Among the collections of these writings are *The Yellowplush Papers, The Irish Sketch-Book, Jeames's Diary* and the *Snob Papers.*

**Fame Came with "Vanity Fair."** In 1836 Thackeray married Miss Isabella Shawe, who bore him three daughters, of whom one died in infancy. In 1840, however, Mrs. Thackeray's mind failed, and her husband was finally forced to abandon hope of her recovery. Meanwhile, his work had been growing in popularity, and with the appearance, in 1846-1848, of the serially published *Vanity Fair,* he became famous. In this novel his intense hatred of sham and pretense is expressed in a satirical and wonderfully realistic picture of the life of the English upper class—a picture in which sordid desire for rank and wealth and snobbish deference to the possessors of these prizes are held up to ridicule and rebuke.

Not only casual readers, but those as well who should see more deeply, have often called Thackeray cynical, but that he never was—he was too clear-sighted and too kindly. Indeed, his very ridicule of insincerity and vain show is praise for the opposite virtues. *Vanity Fair* was followed by *Pendennis,* which is in a measure autobiographical; *Henry Esmond,* a most faithful representation of English life in the early eighteenth century, by many reckoned his masterpiece and by some the greatest of English novels; and *The Newcomes,* which by its pathos proves once and for all that Thackeray was no cynic. Colonel Newcome is one of the finest characters in all fiction.

In the year that *Henry Esmond* was published (1852), Thackeray gave further evidence of his keen insight into eighteenth century life in his lectures on *The English Humorists of the Eighteenth Century,* delivered in the United States. In 1855 he made a second tour lecturing on *The Four Georges.* These two series of lectures were published later, and are among the most delightful essays of the age. From 1860 to 1862 he was editor of the *Cornhill Magazine,* in which appeared his *Lovel the Widower, The Adventures of Philip, The Roundabout Papers* (a series of charming essays), and the first part of *Denis Duval,* left unfinished at the author's death. *The Virginians,* a sequel to *Henry Esmond,* published in 1857, is his only other really important novel.

**His Place in Literature.** It is the natural thing to compare Dickens and Thackeray, the two great humorous novelists of the age. Thackeray was a year older, but Dickens was the first to become popular, largely because of his energy and his self-confidence. Thackeray, on the other hand, was shy and sensitive all his life, and had always to drive himself to his work. The two were friends, without thought of jealousy; and by their pictures of English life, high and low, did an infinite service in making the England of their days live in the future.

Thackeray's style is remarkable for its ease and simplicity. As he says himself, he likes "occasionally to step down from the platform and talk about" his characters, and this familiar, colloquial manner is one of the chief charms of his writings. A.MC C.

Consult Crowe's *Homes and Haunts of Thackeray;* Benjamin's *Some Aspects of Thackeray.*

**THALER,** *tah'ler,* a large silver coin current in Germany from the sixteenth century until 1873. A few of these coins are still in circulation and are equal in value to three marks, or 71.4 cents. The thaler was first coined in 1519, in the Bohemian town of Joachimsthal, from which it received the early name *Joachimsthaler.* See MARK.

**THALES,** *tha'leez,* one of the Seven Sages of Ancient Greece and the founder of the earliest school of Greek philosophers, at Ionia in Asia Minor. He belonged to the period covering the first half of the sixth century B. C., and was a native of Miletus, in Asia Minor. He founded the geometry of lines, having learned the geometry of surfaces from the Egyptians, and was the first to apply that science to practical use in the measurement of the distance of ships at sea, the height of pyramids, etc. Much of his fame in his own day was the result of an accurate prediction of an eclipse. The philosophy of Thales was based on the theory that all things are composed of water, which, though false, was the origin of the later philosophies. See PHILOSOPHY.

**THAMES,** *temz,* THE, England's most important, though not its largest, river. Roman writers mention the *Tamesia,* and the name is probably a Celtic word, meaning *broad river.* It rises in Cirencester, in south-central England, and flows easterly for 228 miles to the North Sea. On its banks are Eton, Oxford, Henley, Windsor and many places almost equally interesting. The Thames is navigable for barges to within eighteen miles of its source, and lately it has been deepened at London until it is readily accessible to the largest shipping vessels. The tonnage of the imports and exports handled in London harbor in 1912 was 19,548,000, three-fourths of which was import, principally wool from Australia.

**THAMES RIVER,** BATTLE OF THE, also known as the BATTLE OF MORAVIANTOWN, in the War of 1812. It was the direct result of Perry's naval victory on Lake Erie, after which he sent to General William Henry Harrison the famous message, "We have met the enemy, and they are ours." Perry's victory gave the Americans control of Lake Erie, and made it necessary for the British to abandon Detroit. The British garrison under Colonel Proctor, accompanied by a force of 600 Indians led by Tecumseh, crossed into Canada, where they were pursued for several days by 3,000 Americans under General Harrison. Although outnumbered two to one, the British finally halted at Moraviantown, on the Thames River, in Kent County, Ontario, and on October 5, 1813, offered battle. Almost at the first volley Proctor and many of his men fled, but Tecumseh (which see) fell fighting on the battle field. The Americans burned Moraviantown the next day, and then marched back to Detroit. The death of Tecumseh, foremost of the Indian chiefs, broke the league of tribes which had been allied to the British, and practically ended the coöperation of the British and Indians on the northwest frontier. Proctor was afterwards publicly reprimanded by a court-martial and was suspended from his rank and deprived of his pay for six months.

**THANE,** a title of Anglo-Saxon origin, meaning variously a servant, attendant, retainer, or official, but always with a military significance. In old England there was a system of thanehood, quite similar to knighthood of later days; a freeman who was not of noble parentage might become a thane by acquiring a certain portion of land, by making three sea voyages or by taking holy orders. He was then recognized as a member of the territorial nobility, and his sons inherited his thanehood.

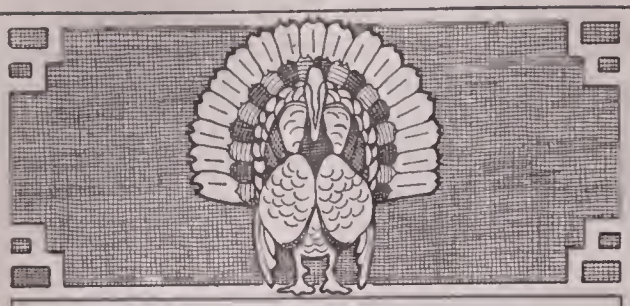
The thane had a vote in the local and general Witenagemot, or assembly. A thane of ordinary standing was sometimes known as "lord of the manor," while a successful thane might hope to become an earl. The king's thane was a member of his bodyguard, was therefore a personal attendant in war, and an important person, who had great freedom of social privilege; he was responsible only to the king for his deeds or behavior. On retiring from personal service to the king he was given a grant of land. There were other degrees of thanes, as bishop's thane, a thane's thane, etc. After the reign of Henry II the thane was not known in English history.

The thane was an important figure in story and verse of olden time. Shakespeare causes Macbeth to say (*Macbeth,* Act I, sc. 3), "I know I am Thane of Glamis;" and Stevens, in his notes, explains that the thaneship of Glamis was the ancient inheritance of the Macbeth family. Sir Walter Scott, in his *Lay of the Last Minstrel* (c. 5), makes the chief see—

> . . . in the thanedom once his own,
> His ashes indistinguished lie.

**THANET,** OCTAVE. See FRENCH, ALICE.

**THANKSGIV'ING DAY,** in the United States and Canada, a day set apart annually for the giving of thanks to God for the blessings of the year. Originally it was a harvest thanks-



## *Suggestive Program for Thanksgiving*

The wee bird has its nest,
Safe in the tree so tall;
For birdlings' nest, for children's homes,
I thank the Lord for all.

*Thanksgiving Hymn*.....*Montgomery*

*A Thanksgiving*.....*Lucy Larcom*

Reading of the Thanksgiving Proclamation

*When the Frost Is on the Punkin*..*Riley*

Essay, *The First Thanksgiving*

*Thanksgiving Day*.....*Lydia M. Child*

*Autumn Fires*.....*Stevenson*

Essay, *The Pilgrims' Journey to America*

*What the Wood Fire Said to the Little Boy*.....*Frank L. Stanton*

*The Pumpkin*.....*Whittier*

*Fable of the Ant and the Grasshopper*

*The Story of a Seed*

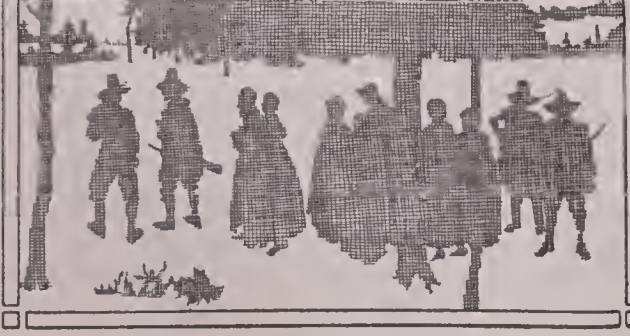
Thanksgiving quotations

*The Gift of Maize,* from *Hiawatha's Fasting*.....*Longfellow*

Tableaux

Puritans going to church
The Puritan (Deacon Chapin)
Priscilla and John Alden
A Thanksgiving dinner in old New England
The visit of an Indian chief
Landing on Plymouth Rock

Song, *We Thank Thee*



giving, and while the purpose has become less specific, the festival still takes place late in the autumn after the crops have been gathered. Indeed, it is probably an outgrowth of the harvest celebrations of England.

**The First Thanksgiving in the New World.** In Plymouth Colony the first dreadful winter, during which almost half of the Pilgrim company died, had passed, and renewed hope had grown up with the summer. With the fall, the corn crop was gathered, and Governor Bradford decreed a day of thanksgiving. Great were the preparations—the few women in the colony spent days before boiling and baking and roasting; and even the children were busy turning the roasts on the spits before the open fires. As guests, there were more than fourscore friendly Indians, who brought as their share of the feast wild turkeys and venison from the woods. The tables were set out of doors, and the company sat about them as one big family. This first Thanksgiving, however, was not merely a feast—there were prayers and sermons and songs of praise; and three days had gone by before the Indians returned to their forest and the colonists to their tasks.

**Later History.** From Plymouth the custom spread to the other colonies, until in time the governor of each issued such a proclamation annually. During the Revolutionary War eight special thanksgiving days were observed after signal victories or wonderful deliverances from danger, and President Washington issued a general thanksgiving-day proclamation in 1789. In the same year the Protestant Episcopal Church in America announced the first Thursday in November as a regular annual day for giving thanks, "unless another day be appointed by the civil authorities."

But there was no uniformity. Some states had an annual thanksgiving, others did not, and no proclamation was issued by the President. One woman, Mrs. Sarah Josepha Hale, the editor of *Godey's Lady Book,* took an intense interest in the subject, and for twenty years sent out pleas through the columns of her journal for a nation-wide thanksgiving. Nor did she stop at this. She wrote letters to each of the Presidents; and finally, in 1863, her efforts were rewarded, for President Lincoln appointed the last Thursday of November as Thanksgiving Day. Thus Mrs. Hale won the title of the "Mother of Thanksgiving."

From 1863 the same day has been regularly set apart. The President annually makes a formal announcement, and the governors of the

various states issue proclamations calling on the people to give thanks. The day is not a national legal holiday—the United States has no legal holidays, not even the Fourth of July; but almost every state has legalized it, by legislative act. Throughout the country, but especially in New England where the custom originated, the day is looked upon with great reverence. It is peculiarly a family day, and the very sound of the name brings back inevitable memories of "back home;" of the old farmhouse kitchen and the pantry crowded with "good things."

**Thanksgiving Day in Canada.** The Dominion, too, has an annual Thanksgiving Day, which is celebrated in much the same way, with family reunions and religious services. It is proclaimed by the Governor-General as a harvest festival, and unlike that of the United States is not always set for the same day. Usually it falls in the last week in October, but if harvest is especially early, an earlier day may be appointed. It is not strictly a legal holiday, being dependent solely on the government proclamation. A.MC C.

Consult Sindelar's *Thanksgiving Entertainments;* Love's *The Fast and Thanksgiving Days of New England.*

**THE'ATER,** a building in which to view dramas and other spectacles. The modern theater consists mainly of two parts, the auditorium and the stage. The auditorium is for the accommodation of spectators and includes entrances and exits, stairs, offices and rooms necessary to the conduct of the theater and convenience of patrons. The auditorium is usually of horseshoe shape, with the floor sloping upward from the stage. Balconies, varying in number from one to four, are built in most theaters and follow the horseshoe shape of the auditorium. Immediately in front of the stage a place is provided for the orchestra.

The stage itself is reserved for the actors and the scenery, which, to meet the demands of modern audiences, must be extremely elaborate. Behind and at the sides of the stage are the dressing rooms for the performers. To handle the scenery and shift it into the changing positions demanded during performances requires the employment of a large number of men. Above the stage are the "flies," where the scenery is hung in pieces ready to be lowered into position on the stage, and below it is another space of sufficient depth to allow the scenery from the stage to be lowered into it. In modern theaters scenic effects can be obtained that only a few years ago would have been considered impossible. By mechanical means, horse races, chariot races, moving trains and steamboats are produced with great skill.

The lighting system of a modern theater is quite different from what it was fifty years ago. A complete system of electric lighting for the whole theater is now controlled by one or two men operating at a table at the side of the stage. Protection against fire is carefully provided for; to prevent the spread of fire from stage to auditorium theaters are now compelled by law to be provided with a fireproof curtain, made usually of iron in sheets or asbestos.

The price of seats in theaters varies considerably. In the time of Shakespeare seats in English theaters ranged from one penny (two cents) to one shilling (twenty-four cents); soon after the Revolutionary War the price of seats in American theaters was twenty-five cents for the gallery and $1 for box seats. In New York the usual price for orchestra seats to-day is $2 and $2.50; in Chicago, Boston, Philadelphia and other large cities it is from $1.50 to $2.00. This is more than is demanded for seats in Germany, where the best seats are never sold for more than $1.50. The principal London theaters demand $2.50 for the best seats.

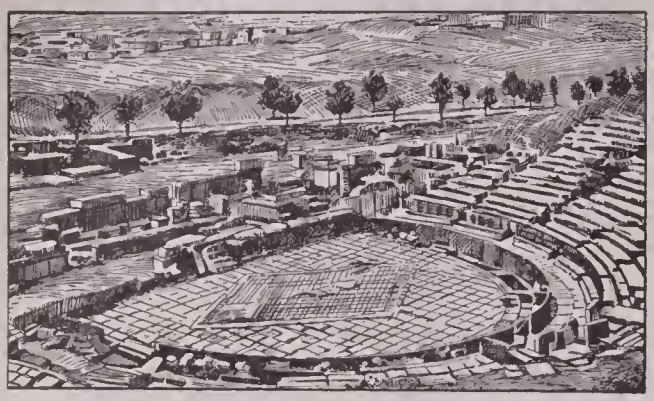
Theaters are compelled to follow certain rules in building arrangements, to furnish a specified number of exits and to be provided with efficient fire-fighting apparatus. The neglect of these precautions has led to terrible disasters, notably the burning of the Iroquois theater in Chicago (1903), in which 575 were killed; Lehman's Theater, Petrograd (1836), in which 700 died; and the Ring Theater, Vienna (1881), in which 640 perished. At least five other theater fires have occurred in which more than 200 lives were lost.

According to law patrons of the theater may express their approval or disapproval of a performance in a moderate manner, but if doing so with intention to stop or interfere with the performance they are liable to forcible ejection.

**Ancient Theaters.** The first theaters of Greece were rude affairs built of scaffolding round a space in which the actors performed. As the drama developed, so did the theater. The collapse of a theater in 499 B. C. led to the building of more permanent structures, though it was not until many years later that stone buildings were erected. The theater of Dionysus in Athens, remains of which are still to be seen, was a work of the fourth century and was completed under the direction of the statesman

Lycurgus. The ruins of theaters which are to be seen throughout Greece are all greatly similar to the first theaters of Athens. Some of these were vast structures capable of accommodating from 10,000 to 40,000 spectators.

The Roman theaters closely resembled the Greek. The building was in the form of a



THE THEATER OF DIONYSUS
The oldest known theater in the world, capable of seating 20,000 people.

semicircle, not covered by any roof. While the Greek semicircle was often cut out of the side of a hill with the seats arranged in tiers up the slope, the Roman theaters were usually built on the level. The part which would now be called the auditorium was called the *cavea.* The stage was in Greek called the *proskenion,* from which the modern word *proscenium* is derived. The back of the stage, generally a blank wall supposed to represent any building before which the action of the drama took place, was called the *skene,* evidently the origin of the present-day word *scenery.* The space between the stage and the audience was then as now called the orchestra and was devoted to the musicians by the Greeks but in Roman theaters was occupied exclusively by the senators.

The immense size of the early theaters made it impossible for the actors to be heard by all the audience. Metal mouthpieces similar in principle to the megaphone were worn. The actors were all males, the parts of women being taken by young men. In more modern theaters boys and young men continued to play female parts until 1662; then manager D'Avenant, who introduced movable scenery into London theaters, also brought in the great innovation of allowing women to appear on the stage. F.ST.A.

Consult Moderwell's *The Theater of To-day;* Moses's *The American Dramatist;* Cheney's *The New Movement in the Theatre.*

**THEBES,** *theebz,* a splendid city of ancient Egypt, for centuries the seat of government of the Pharaohs. A few straggling villages now occupy the site of the once famous capital, which lay on the banks of the River Nile in Upper Egypt (see map on page 1969). On this site may be seen to-day some of the most impressive ruins that have been preserved from antiquity—ruins of temples, tombs, obelisks, avenues of sphinxes and colossal statues, extending along the river for nearly seven miles. To the north, on the eastern bank, in the little village of Karnak, are the remains of the celebrated temple erected in honor of the god Ammon. The gigantic columns of this edifice, the largest temple ever constructed, are illustrated here. The temple was built by several successive kings, including Seti I and Rameses II.

The village of Luxor, south of Karnak, contains the ruins of another impressive temple, built about the year 1500 B.C. by Amenophis III. Three of six colossal statues of Rameses II, carved from single blocks of black granite,

HALL OF COLUMNS, AT KARNAK
The obelisk in the distant center dates from 1600 B. C.

are conspicuous among the ruins of Luxor (see page 1971). At Thebes, too, was set up the colossal statue known as the "Vocal Memnon" (for description and picture see pages 3727 and 3728). Of this city one historian has written—

"In spite of all the ravages of time and of the barbarian, Thebes still presents the grandest, the

most prodigious assemblage of buildings ever erected by the hand of man."

Consult the *Bulletin of the Metropolitan Museum of New York,* issued in 1914.

**THEBES,** an ancient city state in Boeotia, head of the confederacy known as the Boeotian League, and at one time the supreme power in Greece. Thebes lay in the southeastern part of the country, about forty miles north of Athens and midway between Mount Helicon and the channel separating Boeotia and the island of Euboea. According to tradition it was founded by Cadmus, and there is a cycle of legends associated with the city that is almost as famous as the one connected with Troy.

The authentic record of Theban history begins with a controversy between Thebes and Plataea, toward the close of the sixth century B. C. Plataea then came under the protection of Athens, and refused to join the Boeotian League.

In 431 B. C. a Theban force made an attack on Plataea by night, an event that precipitated the long-threatening Peloponnesian War. During that conflict Thebes fought with Sparta, and it remained the latter's ally until Spartan cruelty and treachery made a further alliance impossible. Under the tyrannical rule of Sparta the Boeotian League fell to pieces, but between 379 and 374 B. C. it was revived by the patriotic efforts of Pelopidas, and in 371 B. C. the Thebans under Epaminondas wrested Grecian supremacy from the Spartans by the victory of Leuctra.

Theban supremacy came to an end with the death of Epaminondas in 362 B. C., and in the period that followed the exhausted and disunited Greek states came under the rule of Philip of Macedon and his ambitious son, Alexander the Great. When the latter ascended the throne the Thebans revolted, but their uprising was crushed and their city destroyed, no house being spared except that of the poet Pindar. Under Roman rule Thebes again became prosperous, but it declined under the Turks, and the site is now occupied by an unimportant country town—Thiva, or Rhiva—with a population of about 3,500.

**Related Subjects.** The reader is referred to the following articles in these volumes:

Alexander the Great
Boeotia
Cadmus
Epaminondas
Greece, subtitle *History*

**THEMISTOCLES,** *the mis' toh kleez* (about 514-449 B. C), an Athenian statesman and soldier, one of the chief figures in the stirring times of the Persian wars. Nothing is known of his early life, but after the Battle of Marathon and the withdrawal of the Persians in 490 B. C. he became prominent as the rival of Aristides and the advocate of naval expansion for Athens. In 483 B. C. he succeeded in having Aristides unjustly banished and persuaded the Athenians to build ships and fortify their harbors, feeling certain that in case of renewed invasion by the Persians the conflict would be decided on the sea.

At the time of the Persian expedition in 480 B. C. he was the chief man in Athens and one of the most powerful statesmen in Greece. With patriotic surrender of his right as commander of the fleet, however, he consented to serve under the nominal leadership of the Spartan Eurybiades, though it was really Themistocles who brought matters to an issue favorable to Greece in the great battle of Salamis.

He was then more powerful than before, and did Athens good service by holding the Spartans in diplomatic parleyings until the walls of Athens were practically rebuilt, contrary to the express demands of the Spartans. His arrogance alienated the affections of the people, however, who began to credit rumors that he was not above treason if the bribes were sufficient, and some time before 471 B. C. he was ostracized. After remaining for a time in Argos, he fled to the Persian court and was assigned by the king of Persia a residence in Magnesia, where he lived in luxury until his death.

According to some accounts he committed suicide by taking poison. Though there remain against him suspicions of treason, he undoubtedly was in his day the savior of Greece, and by his naval policy laid the foundations for the future predominance of Athens in Greece.

**Related Subjects.** The following articles in these volumes will explain the references in the above study of Themistocles and give added information:

Aristides
Greece, subhead *The Period of Glory*
Marathon
Ostracism
Persian Wars
Salamis

**THEOCRACY,** *the ok' ra si,* a word derived from the Greek *Theos,* meaning *God,* and *kratos,* meaning *power,* and applied to a form of government in which God is believed to be the chief executive, and the laws are received as the commandments of the Invisible Ruler. In such a government the members of the priesthood act as interpreters and expounders of the laws and have authority in both civil and religious matters. The most notable theocracy was that of the Israelites, to whom the law was

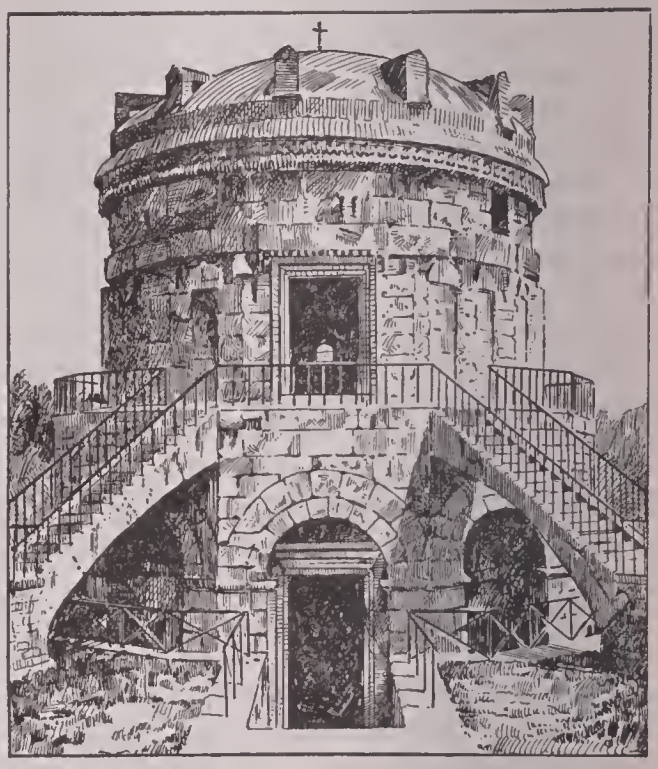
given by God, through Moses, the Ten Commandments forming the basis of the covenant. The Puritan government of Massachusetts was also styled a theocracy, as it was for many years conducted on the principle of obedience to divine law.

**THEOCRITUS,** *the ok'ri tus,* a Greek poet, born either at Cos or at Syracuse. The dates of his birth and death are not known, but he seems to have done his best literary work between 285 and 275 B.C. He traveled widely, was on intimate terms with high officials of Egypt and Syracuse, and apparently led a life notable for honors and gifts. Thirty idylls, or pastoral poems, bear his name, but it is highly probable that several of these were written by other poets. This type of poetry, which he seems to have founded in Greek literature, consists of fresh, vivid descriptions of rural life, and is somewhat in the form of a simple drama with groups of musical shepherds alternately responding. The influence of Theocritus is seen in Vergil and in such modern poets as Tennyson, Swinburne, and Austin Dobson.

**THEODOLITE,** *the od'o lite,* an instrument for the measurement of horizontal and vertical angles, used in surveying. It consists of two graduated circles at right angles to each other, a telescope turning on axes mounted centrically to the circles and a scale for each circle carrying two or more verniers (see VERNIER). Each circle is fitted with a spirit level, to enable the operator to know when the instrument is absolutely level. The whole instrument is mounted on a tripod, the legs of which are pointed with steel. Though still used considerably in England, the theodolite has been practically abandoned by American engineers in favor of the transit. See SURVEYING.

**THEODORIC,** *the od'o rik* (about 454-526), king of the Ostrogoths, commonly known as THEODORIC THE GREAT. He was born in Pannonia, where his father, Theudemir, was joint ruler with his two brothers over the East Goths. When but seven years of age he was sent as a hostage to Constantinople, where he lived for about ten years. In 474 his father died and he became chief ruler, and at once began to threaten the Greek Empire and even Constantinople. He accomplished nothing, but the emperor constantly feared him and in 488 allowed him to proceed against Odoacer, in Italy. For over four years the contest continued, but in 493 Ravenna, where Odoacer had taken refuge, surrendered, and Theodoric's conquest of Italy was complete. The victor killed Odoacer with his own hands, despite the terms of the peace, and took the title of king of Italy.

From that time on Theodoric abandoned war almost entirely, and devoted himself to improving his country, which enjoyed under him a period of unexampled prosperity and peace. Taxes were lightened, agriculture was promoted, and the good will of the original inhabitants of the land sought in every possible way. Theodoric himself was a follower of Arianism, but he showed the broadest tolerance of Catholics until near the close of his reign, when he retaliated for Emperor Justin's persecutions of the Arians by permitting the execution of several leading Catholics. So great was his remorse for this deed that it is believed to have hastened his death. See GOTHS, subhead *Ostrogoths.*



TOMB OF THEODORIC

Erected about the year 530 by order of Theodoric's daughter. It may yet be seen at Ravenna, and is now known as the Church of Santa Maria della Rotonda.

**THEODOSIUS I,** *the o doh'shi us* (about 346-395), a Roman emperor, known as THE GREAT. He was born in Spain, and when little more than a boy was given a command in his father's army; but when his father was put to death he retired from service and lived quietly at home. In 379 Gratian chose him as his colleague, and gave him the Eastern provinces, including Thrace, Dacia, Macedonia and Egypt. The Goths were seriously menacing the empire, and it was the special duty of Theodosius to repel these invasions—a perilous task, but one which he successfully performed.

In 383 Gratian met his death at the instigation of a usurper, Maximus, who for five years ruled the Western Empire as colleague of Theodosius; but in 388 the latter overthrew Maximus and became sole ruler. He recognized the boy Valentinian, son of Gratian, as ruler of the West, and undertook a successful campaign to avenge his death at the hands of Arbogast. A revolt in Thessalonica in 390 roused Theodosius' wrath, and he took a cruel vengeance. The people of Thessalonica were invited to attend an exhibition in the circus, and when 7,000 or more of them had gathered the doors were closed and they were massacred by barbarian soldiers. As a punishment for this inhumanity Ambrose, bishop of Milan, refused Theodosius communion for eight months. Theodosius was zealous for the Christian faith, and ordered the destruction of all heathen temples throughout his dominions.

**THEOPHRASTUS,** *the o fras' tus* (about 372-287 B.C.), a Greek philosopher, born at Eresus, in Lesbos. He was a pupil of Plato and Aristotle in Athens; on the death of the latter he was made head of the Peripatetic School, and held this position from 322 B.C. until the time of his death. His work attracted a large following; he won fame in metaphysics, ethics, natural history and, especially, in botany. Most widely known are his *History of Plants* (nine books), *Theoretical Botany* (six books), and *On Mineralogy* (fragments of which still remain). He also wrote sketches entitled *Characters,* which won the distinction of being imitated during the eighteenth century.

**THEOSOPHY,** *the os' o fi,* a system of occult teaching transferred from India by the efforts of Madame Blavatsky and her followers. See OCCULT; BLAVATSKY, HELENA.

**THERAPEUTICS,** *ther a pu' tiks,* the science of healing disease. It includes every known mode of treatment except the knife (see SURGERY), and may be considered under six divisions—*medical, general, electrical, mental, bacterial* and *preventive.* Medical therapeutics includes treatment by drugs; general therapeutics, treatment by water, sunlight, dieting and massage; electrical, by the X-ray and other forms of electric current; mental, by suggestion, direction of the mental attitude, etc.; bacterial, by the use of antitoxins, vaccination, serum, etc.; preventive, by the application of the principles of sanitation and hygiene.

For a detailed discussion of the various phases of healing see the articles listed at the close of MEDICINE AND DRUGS, DISEASE and HYGIENE.

**THERESA,** *te re' sah,* also spelled **TERESA,** SAINT (1515-1582), was a Spanish nun, a patron saint of Spain. She was born at Avila, in Old Castile, and studied in an Augustinian convent, where she was so stirred by the tales of the ancient holy martyrs that she determined to seek martyrdom for herself. In 1533 she entered a Carmelite convent, and though she frequently deprecated the lack of severity and asceticism in the discipline of the Order, she made for many years no special attempt to introduce reforms. The reading of Augustine's *Confessions,* however, combined with the death of her father and certain supernatural visitations, or trances, to waken in her an intense spirituality, and she began to feel that it was her duty to restore the Carmelite Order to its original rigidness of rule. With a few followers, therefore, she withdrew and set up a new convent where her ideas might be put into force. Opposition to her plan was strong, but the Pope sanctioned it, and finally the general of the Order invited her to introduce her reforms into the other convents. She opened new houses everywhere in Castile and even beyond its boundaries, accomplishing wonders by her unaided efforts.

For years after her death at Alva in 1582 several cities contended for her body, and since the power of working miracles was supposed to inhere in her bones these were carried to various places. She was canonized by Gregory XV in 1622. Despite the visions which those hostile to her in her own day laid to devil possession, but which succeeding generations have interpreted as special signs of the divine favor, she was a woman of the utmost wholesomeness of mind and of much practical wisdom. She wrote an autobiography, several mystic treatises, and left a large number of letters.

Consult *Saint Theresa,* edited by Cardinal Manning; Jameson's *Legends of the Monastic Orders.*

**THER'MAL SPRINGS,** or **HOT SPRINGS,** springs whose waters are warmer than the surrounding air. A thermal spring with water at the boiling point, which spouts into the air at varying intervals, is called a *geyser* (which see). There are also quiet springs which have boiling waters. At the other extreme is the pool at a high altitude whose water is of a higher temperature than that of the surrounding region, but only a few degrees above freezing. It is in volcanic regions that springs having the highest temperature are found, and in such cases the water is heated by flowing over

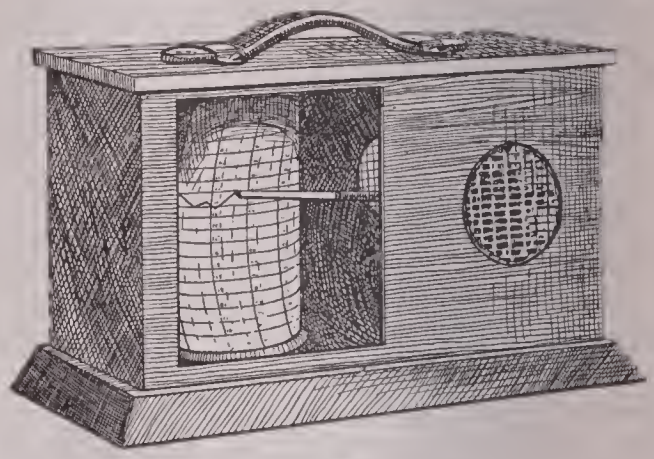
beds of uncooled lava or by coming in contact with hot rocks. Hot springs in nonvolcanic regions are probably caused by the circulation of water at great depths in the earth before it reaches the surface. Many mineral springs are hot springs. See MINERAL WATERS; SPRING.

**THERMOELECTRICITY,** *ther'mo e lek tris'i ti,* the electric current set up in a circuit of two or more unlike metals, or in a circuit of one metal the different sections of which are in unlike physical states, when one of the points of contact is heated or cooled. As electrical energy may be transformed into heat and light, so heat and light may be changed into electrical energy. This may be shown by connecting an iron wire with a German-silver wire and attaching the loose ends to a galvanometer. When the joined ends are heated or cooled, the needle will show a responsive movement. If bismuth and antimony be substituted for iron and German-silver, the effect will be still more marked. Since their electromotive force is greater than that of any other two readily obtainable metals, antimony and bismuth are used in constructing the thermoelectric pile.

This pile, or battery, is constructed of alternate bars of antimony and bismuth soldered together, and is so sensitive to changes in temperature that it makes a very excellent substitute for a thermometer. As long as both faces have the same temperature, there is no current, but the slightest variation sets up a flow of electricity. This change may be almost infinitely small. There is, for example, enough heat in the body of a fly walking across one face of the pile to deflect the needle of the galvanometer. It is obvious that such an instrument is useful for detecting the most minute changes in temperature. This peculiar action of metals of different heat-conducting powers in starting electric currents was first observed by Seebeck in 1822.

See ELECTRICITY, and the various related subjects there named.

**THERMOGRAPH,** *ther'mo graf,* an instrument which automatically makes a record of changes of temperature. A standard pattern, shown in the accompanying illustration, is provided with a spiral coil of metal which unwinds with a rise of temperature and winds up when cooled. These movements are recorded by a long needle carrying a pen, which traces a corresponding zigzag line on a revolving paper sheet moved by clockwork. Degrees of temperature are marked off on this sheet by vertical divisions, while hours of time are designated by horizontal distances. Usually the paper is prepared to receive the record of one week, and when the period is completed the



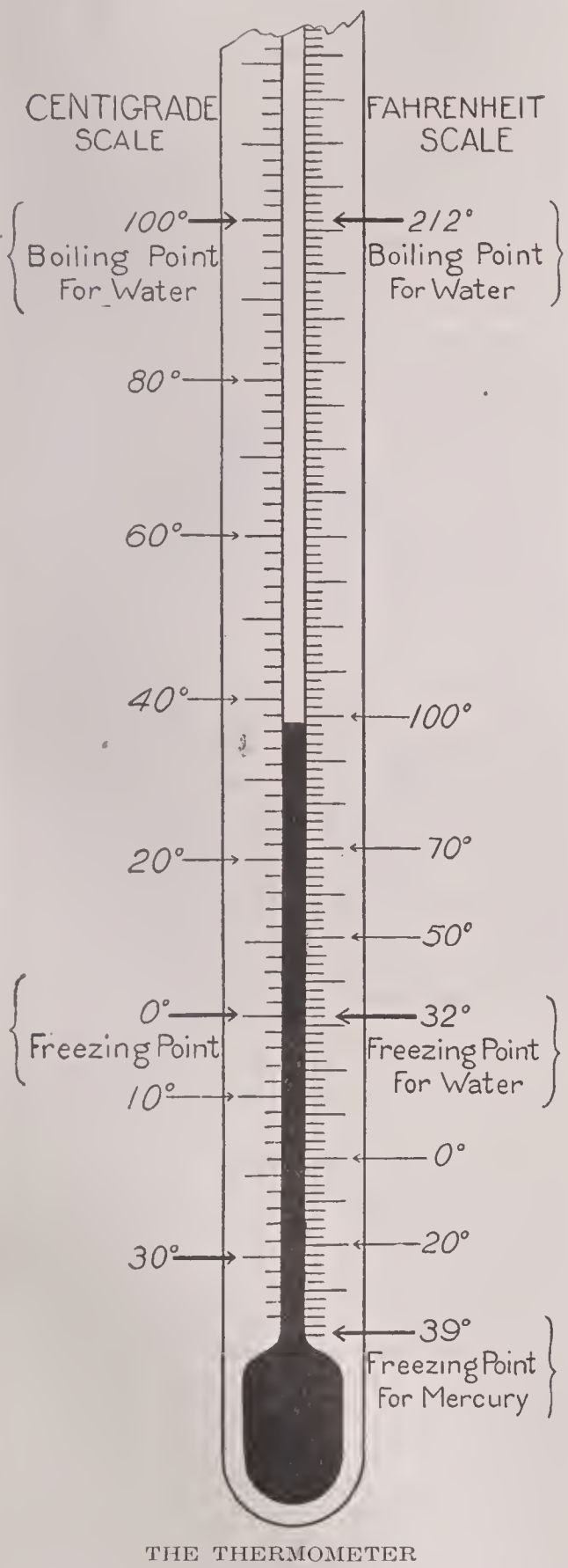
THE THERMOGRAPH

sheet is removed and a fresh one put in its place.

**THERMOMETER,** *ther mom' e ter,* an ingenious instrument for indicating temperature, one of the most useful applications of the law that bodies expand on heating and contract on cooling. There are various forms of thermometer, but the one in most common use consists of a glass tube, with a bulb of mercury or alcohol at the lower end. An increase in temperature causes the liquid to rise in the tube, and the point to which it rises is shown on a scale placed on or back of the tube. As the liquid in the tube has practically the same temperature as that of the surrounding air, the degree of temperature can be accurately read by noting the height to which the mercury or alcohol rises. There are three standard scales—the Fahrenheit, Centigrade and Reaumur—but only the first two are in general use. The Fahrenheit (abbreviated F.) scale has 180 divisions, extending between 212° and 32° above zero. These limits are respectively the boiling and freezing points of water. On the Centigrade (C.) the freezing point is marked 0°, and the boiling point 100°. This scale is used very generally in scientific calculations. The Reaumur scale has 0° for the freezing point and 80° for the boiling. For rules for changing Centigrade readings into Fahrenheit and vice versa, see CENTIGRADE.

**How a Thermometer Is Made.** The glass tubes used for thermometers are constructed so that expansion and contraction will be equal throughout the length, and before being accepted they are thoroughly tested. When a tube is found to be satisfactory, a bulb is blown at one end of it, and the opposite end is worked into a funnel shape. A little mercury is in-

serted through the funnel mouth, while the bulb is gently heated to expel the air. When the bulb is full and sufficient liquid extends above it the funnel end is closed. The closed tube is then immersed in melted ice, the point to which the liquid in the bore drops is observed, and a marking made, thereafter known as the freezing point of water (0° C. or 32° F.). The instrument is then immersed in water and slowly heated until the water boils. Another mark is made at 212° F. or 100° C. The intervening space between the freezing point and the boiling point is subdivided according to scale desired, and the thermometer is ready for use. B.M.W.




THE THERMOMETER

Showing gradings for both Fahrenheit and Centigrade scales. Comparison of the two scales is thus made easy.

**THERMOPYLAE,** *ther mop' i le,* meaning literally the *hot gates,* is a mountain pass of Greece. The mention of it is sufficient to stir in any hearer's mind thoughts of deeds of heroism, for it was here that Leonidas and his followers displayed their unexampled bravery. The pass, which leads from Thessaly into Locris, lies between Mount Oeta and the Maliac Gulf, and was anciently the only way by which an army might pass from northern into southern Greece. As it was but fifty feet wide it was easily defended by a comparatively small force, and was thus one of the important strategic points in the country. When, in August, 480 B.C., Xerxes with his vast hordes of Persia attempted the invasion of Greece, Leonidas, king of Sparta, was sent with 300 Spartans and some 5,000 allies to hold the pass of Thermopylae. For two days the Persians tried in vain to force a way through, even the famous Immortals being turned back, but at evening of the second day a treacherous Greek, Ephialtes by name, showed to Xerxes a path over the mountains, and the Persians were enabled to cross and fall upon the Greek rear. Dismissing at the approach of the enemy all his followers except the Spartans and Thespians, Leonidas prepared to fight to the death, and every Spartan fell.

Two hundred years later (279 B.C.) another invader, Brennus the Gaul, tried to enter Greece through the famous pass. He, too, was held at bay until a way was discovered over the mountains, but this time the Greek defenders managed to escape.

Some of the features of the ancient pass remain unchanged; the hot springs which gave it its name still bubble forth at the foot of the hill and are of value in certain diseases. The pass itself, however, no longer exists, for deposits of the river Spercheius have broadened it to a marshy plain which is in places three miles wide.

Consult Grundy's *The Great Persian War.*

**Related Subjects.** In connection with this article the reader may consult these topics:

| | |
|---|---|
| Greece, subhead *The Period of Glory* | Persian Wars |
| Leonidas | Sparta |
| | Xerxes |

**THER'MOS BOTTLE,** a device for keeping substances either hot or cold. It is based on the principle that heat is transferred by the process of conduction, and that placing a nonconducting body next to a substance causes that substance to retain its heat or prevents outside heat from reaching it.

The thermos bottle consists of a double glass container enclosed in a metal case. The inner glass vessel is fused to the outer after the air between them has been thoroughly exhausted, and the vacuum thus created acts as a nonconductor. Hot liquids poured into the container keep hot because heat cannot flow out across the vacuum, and cold liquids remain cold because outside heat cannot reach them. A cork closes the mouth of the bottle, and a screw cap seals the opening of the metal case. In the bottom of the case there is a spring upon which the container rests.

Theoretically, the contents of the bottle should remain hot or cold, as the case may be, indefinitely, but practically the limit of temperature stability is not more than twenty-four hours. Automobile tourists and picnickers find the thermos bottle a great convenience. The various patterns, which are marketed under different trade names, sell for $1.25 to $5.

**THESEUM,** *the'se um;* among the Greeks, the name given to any temple erected in honor of Theseus. A particularly celebrated one which existed in Athens in ancient times contained what was supposed to be the body of

THE THESEUM

Theseus, and was ornamented with paintings and sculptures showing his deeds. No trace of it remains, and its exact site is uncertain. There still exists, however, a famous and beautiful structure which is called the Theseum, though it was undoubtedly a temple to some god. This, it is true, bears sculptures showing scenes from the life of Theseus, but it has an equal number from the life of Hercules. This temple, the best preserved in Greece, is of Pentelic marble, in the Doric style, and stands at the foot of the Acropolis. The interior to-day bears little resemblance to that of a typical Greek temple, for it was changed many centuries ago when the building was used as a Christian church.

**THESEUS,** *the'se us,* a famous legendary king of Athens, whose marvelous exploits formed themes for Grecian poets, and whose wise and benevolent rule established the original power of Athens. He was the son of Aegeus and Aethra, and was brought up in seclusion by his mother until he became a man. Then he removed the heavy stone which his father had placed over the sword and sandals by which he was to recognize his son, took his legacy and proceeded to Athens. Arrived there, he found his father much under the influence of his wife Medea, who when she saw Theseus recognized as heir to the king, tried to poison him. Upon the failure of her attempt she fled in her dragon car to Media, never to return.

When Theseus learned of the terrible tribute Athens was compelled to pay to Minos, king of Crete, he volunteered to go as part of the sacrifice for that year and, if possible, to kill the Minotaur, whose savage lust for human flesh had to be gratified. Aegeus pleaded in vain, and Theseus set sail in the black-sailed vessel for Crete. He killed the Minotaur, with the aid of Ariadne, the king's daughter, and with her and his joyous companions set sail for Greece. As a punishment for his crime in deserting Ariadne on the return home, Theseus was made to forget to change his vessel's sails from black to white, the agreed sign of the success of his expedition, and in consequence suffered the loss of his father, who killed himself.

On his arrival at Athens he was proclaimed king and entered at once on the beneficent policy which made the city great. After years of prosperous rule, however, he became cruel and overbearing, and was driven by his people into exile. Too late they realized how great a man he had been; and they brought back his remains to the city and buried them in a beautiful temple where the hero was worshiped as a god.

Consult Harrison's *Mythology and Monuments of Ancient Athens.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Ariadne | Minos |
| Athens | Minotaur |

**THESSALONIANS,** *thes a lo'ni anz,* EPISTLES TO THE, two New Testament epistles written by

Paul from Corinth, between 52 and 54 A. D., to the Church in Thessalonica, in Greece, which he had recently organized. The first was written for consolation and encouragement at a time when the Church was suffering persecution from the Jews, and the second to correct the disorder that resulted from an exaggerated belief in the early coming of Christ.

**THESSALY,** *thes'a li,* a district in Northern Greece, in ancient times the largest of the historic divisions of that country. It is an extensive plain, enclosed on all sides by mountains, which form an irregular square, each side of

LOCATION MAP
Thessaly is the black area.

(*a*) Epirus
(*b*) Aetolia
(*c*) Locris
(*d*) Phocis
(*e*) Boeotia

which is about sixty miles in extent. On the north side is the Cambunian range, on the south, Mount Othrys; the majestic Pindus chain forms the western boundary and separates the country from Epirus; Ossa and Pelion, on the east, shut it off from the Aegean Sea. Mount Olympus, the fabled abode of the gods, rises on the northeast to a height of nearly 10,000 feet. The plain of Thessaly is drained by the river Peneus (the modern Salambria), which finds an outlet to the sea in the northeast through the beautiful Vale of Tempe, between Ossa and Olympus.

Among the various sections into which Thessaly is geographically divided, the region to the southeast, on the Pegasaean Gulf (the modern Gulf of Volo) is of special interest because of its association with ancient myth. From there Jason led the Argonauts in quest of the Golden Fleece, and it was the birthplace of the great Achilles. Near the modern Volo is the site of Iolcus, around which cluster many legendary tales. Thucydides is authority for the statement that this region was the early home of the Hellenic race.

The fertility of the soil of Thessaly was a powerful incentive to invasion by tribes from beyond the mountains, and during the period between the heroic and historic eras, this region was the scene of various migrations. The invaders who permanently occupied the country reduced the original inhabitants to the position of serfs, and themselves instituted a landed nobility centered in the cities. Almost unlimited power lay with a few great families, and the cities maintained only a semblance of union, except when they combined in a common cause. When occasion demanded a uniting for war they chose a commander-in-chief who was known as the *tagus.* Their chief strength was in their cavalry; the plains were adapted to the raising of horses, and the Thessalians bred the finest in all Greece.

Only occasionally did the Thessalians enter actively into the affairs of Greece as a whole. In the fourth century B. C., however, united under Jason, the able tyrant of Pherae, they began seriously to threaten the rest of Greece, and were checked only by the assassination of their leader. Thessaly passed under the control of Macedonia in 352 B. C., through the conquest of Philip of Macedon, and was subject to that country until the Roman Flaminius, by the victory of Cynoscephalae, in 197 B. C., made Macedonia a dependency of Rome. Thessaly remained a Roman province until the fall of the Eastern Empire, after which it was dominated successively by the Venetians and the Turks. During the Greek war for liberation, which ended in 1827, the southern part was freed from Turkish rule, and the greater part of the region was united with Greece in 1881 through the intervention of the Great Powers. Thessaly was the chief battle ground in Greece during the war with Turkey in 1897.

At the present time Thessaly comprises the nomes, or departments, of Phthiotis, Larissa, Karditsa, Trikkala and Magnesia, having a combined population of about 575,000. The great majority of the inhabitants are Greek. Volo, the one important port, is a town of over 23,000 inhabitants, and maintains daily steamboat communication with Athens. A railroad connects Volo with Larissa, on the Salambria

(Peneus), a town of about 18,000 inhabitants, and several other lines are distributed throughout the region.

Thessaly has an annual wheat crop of over 4,000,000 bushels, and it yields large quantities of ore and earths. B.M.W.

Consult Wace and Thompson's *Prehistoric Thessaly.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Jason | Philip II |
| Olympus | Tempe, Vale of |

**THET'FORD MINES,** a city in Megantic County, Quebec. It is the center of the world's richest asbestos mining district. Thetford Mines is on the Quebec Central Railway, seventy-six miles southwest of Quebec. Aside from the asbestos mines, the city is of little interest, its only important industrial establishments being sawmills, sash and door factories and foundries. Population in 1911, 7,261; in 1916, estimated 8,500.

**THE'TIS,** in Grecian mythology, one of the sea nymphs, wife of Peleus and mother of Achilles. See MYTHOLOGY.

**THIERS,** *tyair,* LOUIS ADOLPHE (1797-1877), a French statesman, historian and President of the republic, who proved his ability and patriotism at one of the most trying times in the history of his country, at the conclusion of the Franco - German War. He was born in Marseilles and educated for the law, but finding a literary and journalistic career much more to his liking, in 1818 went to Paris to write for the *Constitutionnel.* His Liberal tendencies led him to undertake a *History of the French Revolution* in ten volumes, the last of which was published in 1827. This became extremely popular, despite the fact that like all of Thiers' work it was open to the charge of inaccuracy and unfairness. The *Nationnel,* a paper established by him in 1830 as an opposition organ to the government, had much to do with the Revolution of 1830 which placed Louis Philippe on the throne.

LOUIS ADOLPH THIERS
The first President of the present republic of France.

Under the new monarchy Thiers became a member of the Chamber of Deputies, and between 1832 and 1836 held various offices in the Ministry, much of the time being virtually Prime Minister. He resigned in 1836, but in 1840 again became Premier, only to be driven from office by the king's attitude toward his policy of favoring Mehemet Ali in his conflict with Turkey. For some years then he devoted himself to literary affairs, chiefly to his *Consulate and Empire,* but when the Revolution of 1848 broke out he supported it and favored the establishment of a republic. Louis Napoleon suspected him, and had him banished in 1851, but allowed him to return the next year.

His speeches in the Chamber of Deputies constantly called attention to the unenviable position of France among the nations and so did much to bring on the Franco-German War, but he opposed that struggle and throughout it labored zealously to gain from the other European powers aid for his country. With the defeat of France his opportunity came. He was made "chief of the executive power" in the provisional government and brought about peace with Germany. With great vigor, too, he put down the war of the Commune, and in August, 1871, for his services he was declared President for three years. The indomitable spirit and will which had enabled him to help his country in its extremity had won for him enemies, and by 1873 the opposition had become so pronounced that he resigned. From 1876 until his death he was an influential member of the Chamber of Deputies. A.MC C.

See, in this connection, FRANCO-GERMAN WAR; also FRANCE, subtitle *History,* relating to the period; GERMANY, subtitle *History,* descriptive of the period of the war of 1870-1871, the Franco-German conflict.

**THIRST,** that sensation by which the body announces its need of water. It is one of the *common* sensations, as distinguished from the *special* (see SENSES, SPECIAL), and is thus in the same group as hunger, pain and fatigue. Because the mouth and throat feel dry when one is thirsty, the sensation seems to be a local one. As a matter of fact it is general, for it can be satisfied by injecting fluids into the tissues or veins or by absorption of water through the skin; on the other hand, moistening the mouth without taking water into the system affords only momentary relief.

Water is absolutely essential to the maintenance of life. It forms almost three-fourths of the weight of the body and is found in all its organs and tissues. While it is taken into the body every day through the process of eating,

for practically all foods contain water, health is benefited by the copious drinking of this liquid. Authorities advise the person in normal health to drink six or eight glasses a day. If regular habits of drinking water are cultivated and persisted in, a healthy thirst can be created, and this should be the aim of every one. Such a thirst makes the individual a water drinker in cold as well as in hot weather, when every one drinks freely to offset the loss occasioned by the increase of perspiration. The unnatural thirst that accompanies fever, diabetes and various other diseases is caused by rapid reduction of the body fluids. C.B.B.

**THIR'TY TY'RANTS,** a committee from the aristocratic party at Athens, appointed by the Spartans when they gained supremacy after the Peloponnesian War. They were given dictatorial power in all matters in the state, and under the brilliant but unscrupulous Critias plotted to establish their rule permanently, installing at Athens a Spartan military governor and garrison. They disarmed all the citizens except their own adherents and put to death many wealthy members of the opposing party. In 403 B.C., after about a year of this reign of terror, the old democracy was restored.

**THIRTY YEARS' WAR,** the last of the great religious wars of Europe. It was really a series of conflicts covering the period between 1618 and 1648. Beginning as a civil war in Germany between the Protestant and Roman Catholic parties, it dragged into it one by one most of the nations of Europe, and ended as a general struggle for territory and political power.

**Causes.** The underlying cause of the war was the old, deep-seated hostility between the German Protestants and Roman Catholics, intensified by the different ways in which they interpreted the Treaty of Augsburg (1555), especially with reference to Church property. Both parties violated the treaty whenever they had an opportunity.

**The Outbreak in Bohemia** (1618-1623). In 1608 the Protestants began to get ready for the inevitable clash by organizing the Evangelical Union. The Catholics retaliated with the Holy League. It needed only a special provocation on either side to bring matters to a head. That came when the Archbishop of Prague, the capital of Bohemia, ordered the destruction of a church which the Protestants had begun to build. In anger the people appealed to the king, Ferdinand II. But he was an ardent Catholic and ignored their protests. The majority of the populace were Protestants, and they took this as the signal for revolt. The event with which it began is known in history as the Defenestration of Prague. (*Defenestration* is from the Latin word for *window.*) It was an old Bohemian custom for the people to punish offending officials by throwing them out of a window, and this treatment the mob applied to two of the king's ministers. This act precipitated the civil war that had so long been threatening.

At first the Protestants met with success. They drove out the Jesuits and elected Frederick, the Palatine elector, as their king. But soon the fortunes of war began to favor the other side. Their own Evangelical Union held back its support out of jealousy, for Frederick belonged to the Calvinists, whereas the Union was strongly Lutheran. To make matters still worse for the popular cause, Ferdinand II—a member of the powerful Austrian House of Hapsburg—was made Holy Roman emperor shortly after the revolt started, which naturally put new power into his hands. He was thus able to win an overwhelming victory at the Battle of the White Mountain, after which he sent his hosts throughout the length and breadth of Bohemia and the Rhine country, to pillage and destroy, until the insurrection was thoroughly stamped out. In the end the Bohemian Protestants were deprived of the special religious privileges they had enjoyed, and Catholicism once more became the religion of the land.

**The Danish Period** (1625-1629). With things at such a pass in Bohemia, it was natural that the other Protestant states should begin to look to their own security and consider the necessity of checking the ambitions of their zealous emperor. It was the king of Denmark, Christian IV, who took the first step. Enlisting the aid of one or two other states, and helped by a subsidy from England, he opposed Ferdinand's forces in Saxony. But the emperor had received unexpected assistance from a Bohemian noble named Wallenstein, who raised an immense army of adventurers and foreign mercenaries. This army he placed at the emperor's service without expense, the understanding being that they were to take payment by plundering as they went. Such an arrangement naturally meant untold suffering for the German people, and brought about tragedies that are remembered even to-day, after three hundred years, in the tales the peasants tell their children. This army, and the force of the Holy

League under the great general Tilly, defeated the Danish king, who withdrew after signing the Peace of Lübeck (1629). Even before that the emperor had issued the Edict of Restitution, in accordance with which all Church lands and possessions acquired by the Protestants since the Peace of Augsburg must be returned to the Catholic side. Here was a sure source of further friction.

**The Swedish Period** (1630-1635). The "Lion of the North," Gustavus Adolphus, the great hero-king of Sweden, now entered the combat. He had two motives for interfering: his sincere devotion to Protestantism; and his ambition for Sweden, whose position on the Baltic would be endangered if the emperor succeeded in his plans. This was the first introduction of the political element. In 1630, therefore, Gustavus Adolphus sailed with 16,000 men—the best trained and disciplined army in all Europe. He tried to relieve the city of Magdeburg, under siege because of resisting the Edict of Restitution, but arrived too late to prevent its capture. The sacking of the city was so frightful a catastrophe that Tilly compared it to the fall of Troy and Jerusalem. However, the Swedish army defeated Tilly's forces in the Battle of Breitenfeld (1631), and later in another conflict in which Tilly was killed.

Emperor Ferdinand was now forced to recall Wallenstein, previously dismissed, and another nondescript army from all over Europe gathered together. It met the Swedish forces in the famous Battle of Lützen (1632). In a thick mist that covered the field with darkness Gustavus Adolphus lost his way and somehow met his death; and the spot where he fell is now marked by a splendid monument which the Germans have erected in gratitude to the illustrious prince who saved the Protestant cause. The Swedes won the day and continued the struggle, with varying success, under the Chancellor Oxenstierna. At about this time the emperor, seeing cause to suspect Wallenstein of treason, had him assassinated.

**Swedish-French Period** (1635-1648). The war now lost the religious character entirely and became purely political. Richelieu, the real ruler of France at this time, was a Catholic, but he determined to interfere in behalf of the German Protestants as a means of blocking the growth of Hapsburg power, for France and Austria had been enemies for hundreds of years. In fact, he had assisted Gustavus Adolphus with influence and supplies. In 1635 he adopted direct tactics and flung a French army into Germany. This force united with the Swedish army, and under the brilliant leadership of Turenne and Condé, then just winning their spurs, as well as the Swedish generals Torstensson and Wrangel, a long series of victories was achieved.

**The Peace of Westphalia** (1648). The people had long been crying for peace and relief from the misery this dreadful war brought upon them. In 1645 the European powers sent representatives to a peace conference, the Catholic and Protestant delegates meeting separately in two different cities of Westphalia. Things dragged along until finally, in 1648, the news that the Protestant armies were planning operations against Vienna brought certain concessions from the emperor which made possible the agreement known as the Peace of Westphalia.

**Effects of the War.** Pitiable indeed was the condition of Germany at the close of the war. More than half the population had been killed, and the survivors saw nothing but ruin wherever they looked. Whole cities, villages and farms had disappeared; two-thirds of the property had been destroyed. Wild animals that had been driven out as the country became civilized had returned to the wilderness which war recreated. Art and science, commerce and agriculture were dead. There had been no time to educate the children. Thirty years of fighting had brought a general drop in moral standards, and attracted to Germany, as well as developed within Germany, vicious characters from whom the country suffered for many a decade. A.MC C.

Consult Schiller's *History of the Thirty Years' War in Germany.*

**Related Subjects.** In connection with this discussion of the Thirty Years' War, the following articles in these volumes may be consulted:

Ferdinand (Holy Roman Empire)
Germany, subhead *The Thirty Years' War*
Gustavus, subhead *Gustavus II*
Lützen, Battles of
Magdeburg
Reformation
Richelieu, Cardinal
Tilly, Count of
Wallenstein
Westphalia, subhead *Peace of Westphalia*

**THISTLE,** *this'l,* the name applied to a widely distributed group of plants bearing sharp spines or prickles. They are members of the composite family and are mostly weeds. Of the numerous species the most troublesome is the so-called *Canada thistle,* described and illustrated in these volumes on page 1138. Thistle plants have tough, fibrous stems, much-divided, prickly leaves, and soft, silky flowers of various colors, usually borne in round heads that form

large downy seed balls after the blossoms wither. The seeds are scattered far and wide by the winds, and so thistles multiply rapidly. They also produce vigorous rootstocks, and the complete uprooting of the plant is often a difficult matter. Fragments left in the soil may cause the growth of new plants. The eradication of thistles from grain fields is thus a serious problem. Annual species must be cut down before the flowers bloom.

THE THISTLE

It is supposed that the plant adopted by the Scotch as their national emblem is the species known as *cotton thistle,* so called because it has a covering of white down. Various other species, however, have been given this honor. A number of plants similar to thistles are sometimes called by that name. Conspicuous among these is the *Russian thistle,* or *tumbleweed,* a spiny-leaved plant of the goosefoot family that has caused farmers in Western United States much trouble.

**THISTLE,** Order of the, a royal order of Great Britain, conferred only upon peers of Scotland. Frequently a considerable antiquity is claimed for it, but according to trustworthy records it was founded in 1687 by James II. It was dedicated to Saint Andrew and bears the alternative title of Order of Saint Andrew. At the time of the revolution of 1688 the order lapsed, but Queen Anne revived it in 1703, and to the eight knights companions who with the sovereign made up its original membership four more were added. In 1827 the number of knights companions was fixed at sixteen, and no subsequent change has been made. The thistle is prominent on the badge and collar of the order, which has as its appropriate motto *Nemo me impune lacessit* (No one injures me with impunity).

**THISTLE-BIRD.** See American Goldfinch.

**THOMAS,** *tom'as,* Augustus (1859- ), a foremost American dramatist, author of several plays that show his mastery of the technique of the drama. Notable among these are his *Alabama, Arizona* and *In Mizzoura,* which also illustrate his fondness for using local color, and *The Witching Hour,* which deals with the power of hypnotism. Thomas was born in Saint Louis, Mo. Before he became a playwright he had a varied career as page boy in Congress, law student, employee in a railroad freight house, newspaper writer, and editor and proprietor of the Kansas City *Mirror.* His first play, *Alabama,* was successfully produced in 1891, and thereafter he gave his whole time to dramatic work. In 1915, after the death of Charles Frohman, who was lost on the *Lusitania,* Thomas became art director of the Frohman theatrical enterprises. Among his plays not mentioned above are *The Man Upstairs, Mrs. Leffingwell's Boots, The Harvest Moon, As a Man Thinks* and *Rio Grande.*

**THOMAS,** George Henry (1816-1870), an American military leader who gained the title "The Rock of Chickamauga" for his steadfastness in one of the most desperate battles of the War of Secession. In that battle his unflinching courage saved the Union army from total defeat (see Chickamauga, Battle of).

GENERAL THOMAS

Thomas was born in Southampton County, Virginia. After his graduation at West Point, in 1840, he fought in the Mexican War, served as instructor at the national Military Academy, and for five years commanded (as major) the Second Cavalry in Texas. When the War of Secession began he remained loyal to the Union, though a Southerner by birth, and early in the war was conspicuous at the Battle of Mill Springs, during the siege of Corinth, and at Perryville and Stone River. It was in September, 1863, that he became a Union hero through his gallant conduct at Chickamauga. Soon after this he was made commander of the Army of the Cumberland. When, in December, 1864, he crushed Hood's army at the Battle of Nashville, Thomas was promoted to be major-general in the regular army, and given a vote of thanks by Congress. During the rest of the war he commanded the Military Division of the Tennessee. General Thomas was one of the most reliable officers in the Union army, and he was thoroughly trusted both by his soldiers and by his superior officers, not only for his skill but for his sterling character.

**THOMAS,** Saint, one of the Twelve Apostles, commonly referred to as *Doubting Thomas,* because he was loath to believe that Christ had indeed been raised from the dead (*John* XX, 24-29). His Greek name, *Didymus,* by which he was also known, means *twin,* but there is no mention in the Scriptures of a brother, though tradition has attempted to make Thomas the twin of Christ's brother James. Matthew, Mark and Luke tell nothing of Thomas beyond his name in the lists of Apostles, but John, in the verses above referred to, adds an account of the circumstances which won for him his name.

Of Thomas' later history the *Acts of the Apostles* makes no mention, but tradition makes him a missionary to Parthia or, according to other accounts, to India. This later, or Indian, legend declares that he suffered martyrdom at Mount Saint Thomas, near Madras, in what is now Southeastern India, and certain churches in India which date from the early years of the Christian Era, and which have most remarkably retained their identity through all the centuries, call themselves "Thomas Christians" and claim him as their founder.

**THOMAS,** Theodore (1835-1905), an American orchestra conductor, born at Esens, in Hanover, Germany. His musical training was received mainly from his father, and at the age of ten he began to give public violin concerts in Hanover. A few months later he emigrated to America, played with various New York orchestras for two years, and then accompanied Jenny Lind as a violinist on her first American tour. In spite of his ability as a musician life was a bitter struggle for him for some years, and he himself declared that there were many times when he was so nearly frozen that he could not finger the violin upon reaching the orchestra pit.

In 1861 he began the formation of a great orchestra, and within three years had raised it to such a standard that he was invited by patrons of music in New York to give concerts there. By 1869 the organization was known throughout the world, and was in constant demand for tours of the larger American cities. Thomas accepted the directorship of the Cincinnati College of Music in 1878, but failed to find there the scope of work he desired and two years later again went to New York. He became conductor of the Brooklyn Philharmonic Society, and once more showed his qualities as an inspiring leader by the skill and finish developed in the organization.

In 1890 he went to Chicago, where again he established one of the greatest orchestras of the world. For years there was annually a heavy deficit, but Chicago music patrons gladly paid the debts incurred in presenting music of so noble a standard. Thomas absolutely refused to present music of a low type, and he lived to see audiences able to appreciate his musical ideals. In 1904 a recital hall costing $750,000 was erected in Chicago especially for his orchestra, but within a few months of its completion overwork exhausted him and he died early in the next year. His successor was Frederick Stock.

**THOMAS À KEM'PIS** (about 1380-1471), a religious writer, reputed author of *Imitation of Christ,* one of the most famous devotional books ever written. He was born at Kempen, in the Lower Rhine District, of a family whose name was Hemerken, was given a good education and about the year 1400 entered the Augustinian monastery of Mount Saint Agnes, near Zwolle. In 1413 he was ordained a priest, and thereafter lived in quiet at Mount Saint Agnes, becoming subprior in 1425. He wrote *Meditations on Christ's Life, The Soul's Soliloquy* and *Garden of Roses,* but these are practically unnoticed because of the greater fame of his *Imitation of Christ,* which has passed through many hundred editions in all languages. There is still, it is true, some controversy about the authorship of this work, but it is almost universally accredited to Thomas à Kempis. A manuscript copy of it in his own hand exists, but this is not positive proof, as all monks were zealous copyists of good books.

This book, which has been more widely read than any other religious writing except the Bible, grew out of the author's monastic life, and aims to give counsel to all who are seeking the path to righteousness. Thomas à Kempis, whose piety seems to have been of the most genuine and humble character, finds the root of all good in love, the root of all evil in lack of it. People of distinction and power in every age since his own have been profoundly moved by the book; Luther, Samuel Johnson, George Eliot and Lamartine are but a few of those who have admitted their indebtedness to it.

Consult Scully's *Life of the Venerable Thomas à Kempis;* Kettlewell's *Thomas à Kempis and the Brothers of the Common Life.*

**THOMPSON,** David (1770-1857), a Canadian explorer, the first white man to follow the course of the Columbia River from its source to its mouth. Thompson was an Englishman

by birth, and was educated at Oxford University, but he deserted the university, at the age of nineteen, to enter the service of the Hudson's Bay Company in Canada. For some years he was a clerk for the company, but after 1797, when he became an employee of the Northwest Company, he gave practically all of his time to exploration. In 1798 he discovered Turtle Lake, one of the sources of the Mississippi River. Four years, 1807 to 1811, he spent in the valley of the Columbia, and for ten years, 1816 to 1826, he worked on the Canada-United States boundary survey. Later he had charge of various surveying and exploring expeditions in the Canadian Northwest.

**THOMPSON,** Denman (1833-1911), an American actor who endeared himself to a nation with *The Old Homestead,* a homelike play with a rural setting, was born at Beechwood, Pa. When he was seven years of age his parents moved to New Hampshire. The typical New England life he saw there influenced his entire career, for all of Thompson's success as a player centers about the humorous New England character, Joshua Whitcomb, created and acted by him for so many years. Thompson cared little for school and at the age of seventeen ran away with a circus, in which he served as an acrobat for a year. He then returned home and tried to be content in the mercantile business, but the lure of the stage was too strong, and in 1853 he joined a theatrical stock company at Worcester, Mass.

For some years he played unimportant parts in Canada, the United States and England, but it was not until 1875 that he gained favorable notice. During that year he wrote *Josh Whitcomb,* a sketch showing the peculiarities of the old-fashioned New England farmer, and this was so successful that in 1876 he enlarged it into a play of the same title and produced it in Chicago. This was still more happily received, and Thompson presented it in nearly every state of the Union. In 1887 he again enlarged and revised the story, and this comedy under the name of *The Old Homestead* was enthusiastically received at its first performance in New York. Since that time it has not missed a season on the stage. Thompson wrote another successful play, *The Sunshine of Paradise Alley,* but he will be remembered mainly for the one vivid character he gave American drama.

**THOMPSON,** James Maurice (1844-1901), an American writer, best known as the author of *Alice of Old Vincennes,* a romantic novel of Revolutionary days. This entertaining and well-written story—his best literary achievement—was published the year before his death, and was the culmination of a group of writings that included poems, literary reviews, books on nature and a treatise on archery. Always a lover of outdoor sports, he was an enthusiast on the subject of the bow and arrow. Thompson was born in Fairfield, Ind., but spent most of his boyhood in Georgia and Kentucky, and while still a youth enlisted in the Confederate army.

After the war he returned to his native state, settling in Crawfordsville. There he engaged in law practice and civil engineering and at the same time began his career as a writer. He became a regular contributor of the New York *Independent* in 1883, and for fifteen years was a member of its editorial staff, writing a large portion of its book reviews. His style was fresh and unconventional, and his books bore testimony to an enthusiastic love of nature and out-of-door life. Thompson's writings include, besides his *Alice of Old Vincennes, Hoosier Mosaics, The Witchery of Archery, Songs of Fair Weather, By-Ways and Bird Notes, The Boy's Book of Sport, The Ethics of Literary Art* and *My Winter Garden.*

**THOMPSON,** Sir John Sparrow David (1844-1894), a Canadian jurist and statesman, Premier of the Dominion from 1892 until his death. Sir John became Premier, as successor to Sir John J. C. Abbott, at a time when the Conservative party was showing signs of disintegration. He planned many reforms, not merely for the party but for the Dominion, but he died before he could put many of these into effect. Sir John was a quiet man, who never advertised himself or his deeds, but he stands forth as a man of solid and honest achievement.

Thompson was born at Halifax, N. S. There he received a common school education, studied law in a barrister's office, and was called to the bar in 1865. From the first he took an active interest in political affairs, and in 1877 was elected to the Nova Scotia assembly. A year later he entered the provincial cabinet as attorney-general and in 1882 became premier of Nova Scotia. He held office for only a few weeks, resigning to become chief justice of the provincial supreme court. In 1885, however, he again entered politics, was elected to the Dominion House of Commons, and accepted the place of Minister of Justice in the Macdonald Cabinet. In 1887 he was legal adviser to the British representatives who negotiated the Fish-

eries Treaty with the United States, and in 1893, while Premier, he was one of the arbitrators of the Bering Sea Controversy. Sir John died at Windsor Castle, where he had just taken the oath as a member of the Privy Council. Queen Victoria in 1887 conferred on him the honor of Knight Commander of the Order of Saint Michael and Saint George (K. C. M. G.).

**THOMSON,** JAMES (1700-1748), a Scottish poet, born at Ednam, Roxburghshire. He studied at the University of Edinburgh, where he was to prepare himself for the ministry. This purpose he gave up, however, and after moving to London, began at once to produce poetry. During the next four years appeared successively the poems that compose his *Seasons,* a work that became immediately popular and was revised and expanded in 1744. In 1730 he started on a two years' tour of Europe as tutor of Sir Charles Talbot's son and upon his return was given by his patron, then Lord Chancellor, a position which made practically no demands on him but brought him £300 a year.

This income ceased with the death of Talbot in 1737, but in the following year Thomson was granted a pension and in 1744 was made surveyor-general of the Leeward Islands. In the year of his death appeared *The Castle of Indolence,* in which he attempted, with much success, to reproduce not only the form but the spirit of Spenser's *Faerie Queene.* Among his other writings are the tragedy *Tancred and Sigismunda* and *The Masque of Alfred,* in which occurs the famous *Rule Britannia.* Some critics declare that the honor of the latter composition should be shared with other writers of the day, and that it was not entirely his own. The poems of Thomson have a peculiar interest because they were the first to show the change from devotion to mere form, as in the classical age, to a free and natural treatment of the beauties of nature.

**THOR,** *thawr,* the thunderer, in Northern mythology, the eldest son of Odin and the strongest of the gods, their champion in the almost incessant wars against the giants. As a child Thor was noted for his size and great strength. Ordinarily he was a good-natured boy, but sometimes he fell into such terrible passions that his mother was unable to control him, so she gave him into the charge of foster parents, who brought him up very wisely. When he had grown to maturity he built in Asgard a wonderful palace which he named Bilskirnir (lightning). Thor was especially the god of peasants and the laboring classes, and in the 540 halls of his great palace he met his favorite dead and feasted with them, as Odin did with their masters.

Thor's wife was Sif, whose chief attraction was her long, golden hair, which covered her from head to foot like a veil. One morning Sif awoke and found her beautiful hair all gone. Thor, who admired it excessively, vowed that he would punish the thief most severely. He suspected Loki as the culprit, and having followed him through numerous changing forms, at last captured him and compelled him to admit that he had taken Sif's golden hair. Thor, however, consented to let the traitor go if he would procure a new head of hair as beautiful as the first.

At once Loki proceeded to the realm of the dwarfs, where he begged Dvalin to make the hair, and at the same time prepare presents for both Odin and Frey, whose anger he wished to disarm. For Odin the dwarf made the famous spear which never failed in its aim, and for Frey the ship which sailed over land as well as water, and then he spun from the finest gold thread the long tresses which were warranted to grow luxuriantly again as soon as they touched the head of Sif. The skill with which this was done led to wagers being laid among the dwarfs, and as a result of their competition they made many other magic things which the gods afterwards possessed. They made the enormous boar with its golden bristles for Frey, the magic ring of gold from which, every ninth night, eight similar rings dropped; and a magic hammer which came back to the hand that threw it. This last gift was for Thor. The hammer was always red hot, and even the handle was so heated that the god was obliged to wear an iron gauntlet in order to use it. Besides this, Thor possessed a magic girdle which doubled his strength whenever he drew it around his body.

As Thor rode about the heavens in his brazen chariot drawn by two goats, from whose teeth and hoofs sparks were constantly flying, the lightnings flashed from his hammer, and as he threw it through the air, the thunder roared. In art Thor is represented as a man in the prime of life, tall, well formed, with bristling red hair and beard and strong, muscular limbs. Thursday is Thor's day. A.MC C.

**THORACIC DUCT,** *tho ras'ik dukt,* one of the main tubes of the lymphatic system, or the network of vessels carrying the fluid (lymph) from which the body cells obtain nourishment. It is the great trunk which receives the lymph

from the lower limbs and chyle from the intestinal tract. This duct, which is about the size of a goose quill and from fifteen to eighteen inches long, begins below in a dilated portion called the receptacle of the chyle, and extends up along the front of the spinal column to the seventh vertebra of the neck; there it curves forward and downward, opening into the junction of the left jugular and left subclavian veins (see color diagram opposite page 1388). See also LYMPH, subhead *The Lymphatic System.*

**THOREAU,** *tho'ro,* or *tho ro'*, HENRY DAVID (1817-1862), an American writer on nature, born at Concord, Mass., of Scotch and French descent. His father had been a merchant, but had taken up the manufacture of lead pencils, an occupation which Thoreau also followed at times. He was graduated from Harvard in 1837, and in the same year began his lifelong habit of keeping a journal. For several years he taught school at Concord and on Staten Island, N. Y., and delivered lyceum lectures in New England. Meantime he took a boating trip with his brother on the Merrimac River, and his description of this outing, with his reflections by the way, later made up his first volume—*A Week on the Concord and Merrimac Rivers.* One thousand copies were printed, but only about two hundred were sold, and the rest were sent back to the author, who used to say thereafter, "I have now a library of nearly nine hundred volumes, over seven hundred of which I wrote myself."

HENRY D. THOREAU

**A Life of Seclusion.** In 1841-1843 and 1847-1848 Thoreau lived with Emerson; but part of the interval between he spent at Walden Pend, near Concord, where he enjoyed a sort of hermit's life. He wished to prove his doctrine that a man could live naturally, earn what he needed, and have large leisure for study and culture. His home, which he built with his own hands, cost him twenty-eight dollars; he lived very frugally, supported himself by odd jobs of surveying and boat building, visited among his neighbors, read widely in several languages, wrote for magazines and kept a journal which he later revised and published under the title *Walden, or Life in the Woods.* This book, probably his best work, shows few discoveries, but proves its author to have been a minute observer. His familiarity with the creatures of the woods was nothing short of remarkable; the birds came when he called, the animals showed no fear of him, even the fish he could lift from the water with his hands.

Thoreau spent most of his life, after leaving Walden, with his parents and sister at Concord, and in tramping trips in the Maine woods, about Cape Cod and in Canada; and his later works are but repetitions, with variations, of his earlier ones. His style is original and stimulating, and his writings, neglected for a time, are taking higher and higher rank. He wrote some verse, which has the charm of force and originality, but which lacks warmth and melody.

**Unusual Character.** There has been much discussion as to Thoreau's character, his admirers holding that his independence and uprightness of spirit set him far above ordinary men, his detractors declaring that his difference from those about him was mere self-conscious eccentricity. It is true that he indulged in many vagaries. He refused to vote, to attend church or to pay taxes, thus registering his protest against what he felt was an artificial life. He was not a hermit in the true sense of the word, however, for he had many valued friends. His bold public defense of John Brown proved that he did have, at times, an interest in others besides himself. A.MC C.

Consult Rickett's *The Vagabond in Literature;* Channing's *Thoreau: The Poet-Naturalist.*

**THO'RIUM,** a heavy metallic element, the dioxide of which, called *thoria,* is used in the manufacture of the mantle of the Welsbach burner. The element, which was discovered in 1828 by Berzelius, a Swedish chemist, is a gray powder which burns with a bright flame when heated in air; it occurs in monazite, orangite, thorite and similar minerals. Thorium has a wide distribution, though it occurs nowhere abundantly. Brazil, Norway and North and South Carolina are important sources of supply. The monazite sands of North Carolina are extensively used by manufacturers of thoria for utilization in the gas-mantle industry. Thorium is one of the radioactive elements (see RADIOACTIVITY).

**THORN APPLE.** See STRAMONIUM.

**THOROLD,** *thawr'old,* a town in Welland County, Ontario. It is on the Grand Trunk

and the Niagara, Saint Catharine's & Ontario railways. These connect with the Michigan Central, Wabash, Pere Marquette and Canadian Pacific railways. Thorold's importance is chiefly due, however, to the Welland Canal, whose newest channel is cut through the town. The coming of the canal is responsible for a rapid growth since 1911. Population in 1911, 2,273; in 1916, estimated, 5,001.

Thorold is in the northern part of the Niagara Peninsula. It is four miles from Saint Catharine's, eight miles by electric trolley south of Niagara Falls and twenty miles north of Port Colborne. Thorold has one of the largest paper mills in the world, and is also a manufacturer of pulp, fiber board, abrasives, knit goods and smelted silver. Electric power is derived from Niagara Falls, and also from abundant natural gas in the vicinity. The town was founded in 1792, and was named for Sir John Thorold (died 1815), of Syston Park, England. Sir John is best known as one of the greatest of English book collectors. The town was incorporated in 1875, and until recent years had a slow growth. It is historically interesting as the site of the Battle of Beaver Dam, in which Laura Secord played a conspicuous part.

**THOROUGHWORT,** *tho'ro wurt.* See BONESET.

**THORWALDSEN,** *tawr'wawld sen,* BERTEL (1770-1844), the foremost sculptor of Denmark, and one of the greatest of modern times. Like the great Italian artist Canova he was the exponent of classicism (see SCULPTURE, subhead *Italy*), but he followed the Greek ideal more closely than his famous contemporary, and his works suggest, more than those of any other sculptor of his day, the serene beauty and purity of ancient Greek masterpieces. At the age of eleven Thorwaldsen began his art studies in the academy of Copenhagen, his birthplace. When he was twenty-three he won a gold medal and a scholarship which permitted him to study in Rome. Here his work received generous recognition from Canova, especially the plaster cast of a colossal *Jason with the Golden Fleece.* His first important commission (1803) was an order to reproduce this noble statue in marble, and, having once gained a reputation, he advanced rapidly in fame and fortune.

Among the famous works which he executed within the next few years were a frieze entitled the *Entry of Alexander the Great into Babylon* (in honor of Napoleon's expected visit to Rome), and the model for the *Lion of Lucerne,* a memorial to the Swiss Guards who died in defense of the royal palace at Versailles. This latter was copied by the Swiss sculptor Ahorn when he chiseled the sleeping lion out of the solid rock at Lucerne (see picture on page 3530 accompanying the article LUCERNE). In 1819 Thorwaldsen returned to Copenhagen, and was greeted there with a reception that was a personal triumph. During a brief sojourn in the city he received a commission to decorate the *Church of Our Lady,* and among the figures executed for this purpose is a colossal *Christ* that will always be regarded as one of his masterpieces.

Returning to Rome, Thorwaldsen made for Saint Peter's a monument to Pope Pius VII and executed many other important commissions. In 1825 he was elected president of the Accademia di San Luca, an honor not usually accorded to a Protestant. The last two years of his life were spent in his native city, and all his possessions were left to that municipality for the establishment of the Thorwaldsen Museum. In this institution are preserved the plaster models or originals of all of his sculptures, besides many other art treasures. His influence on contemporary and later artists was far-reaching, and he had a large share in bringing about the classic revival of the nineteenth century. Among his important works, besides those already mentioned, are *Cupid and Psyche, Memorial to Baroness Schubart, Four Seasons* and the medallions *Morning* and *Night.* R.D.M.

**THOTHMES III,** *thoth'meez,* or *toht'maze,* called THE GREAT, a king of ancient Egypt, under whom the country came to the zenith of its prosperity. Through a long series of wars he subjugated Syria, Palestine, part of Mesopotamia—almost all the territory, in fact, from the Nile to the Euphrates. On the walls of the great temple at Karnak he had vainglorious accounts of his campaigns inscribed, erasing the names of earlier rulers to make room for his own. He built many temples, using in that way much of the wealth ravaged from his subject territories, and he erected the famous obelisks known as Cleopatra's Needles, one of which stands now in Central Park, New York, and another in London. The dates of his reign are uncertain, but it seems that he came to the throne about 1538 B. C. and died about 1485 B. C. His mummy, like those of Seti I and Rameses II, was discovered in 1881 at Deir-el-Bahri.

**THOUGHT,** *thawt.* The mind is a storehouse furnished with bits of knowledge which are either innate or have been gathered by ob-

servation, reading and reflection. Thought is the blending, or weaving together, of these bits of knowledge into new and abstract ideas. For example, we may perceive a particular object, such as the Mississippi River, and observe its color and current, or remember when it was discovered, but when we piece together the products of our observation and reading and concentrate our attention upon some particular attribute of the river, such as its importance to commerce, or its relation to other rivers, we are said to *think* or to arrive at our conclusion by processes of *thought*. The observation of an object is often unconscious and performed involuntarily, but thought, or the singling out of a particular attribute of the object, requires conscious effort. We think only when we have some purpose, such as that of discovering likenesses and differences. Oliver Wendell Holmes says that "a thought is often original though you have uttered it a thousand times. It has come to you over new routes by a new train of association."

The psychologist seeks to discover *how* we think. He divides the powers of the mind into *feeling, intellect* and *will,* each of which is more or less represented in every mental act. Every thought is accompanied by a certain amount of feeling and is colored by it, while the will controls thought. The poet Lowell says:

> All thought begins in feeling—wide,
> In the great mass its base is hid,
> And narrowing up to thought stands glorified
> A moveless pyramid.

Similarly there is thought in all emotion, and here again the controlling agency is the will. Further, there are both thought and feeling in every act of will. The first step in the process of thought is *analysis,* or *abstraction,* which is the singling out of the characteristics and qualities of an object and the concentration of the mind upon one of these. The next step is known as *synthesis,* or the combining and relating of the qualities of a certain thing to those of other objects, and comparing them to determine their likenesses or differences.

This concentration of the mind always involves a muscular tension and an adjustment of the nerves and muscles, especially those controlling the movements of the eyes and head, and intense thought cannot be maintained for long periods at a time without physical exhaustion.

The logician is interested, not in the processes of thought, but in how to think *correctly,* and divides thought into three stages: first, the formation of a general idea which he calls *conception;* then the combination of concepts to form a statement, or judgment, and, lastly, the passing from one judgment to another, or the process of reasoning and drawing a conclusion.

Method and concentration are required to produce clear thought. Writing and conversation constitute the harvesting of thought. Not only do they enable us to give our ideas definite form, but they suggest new ideas and open new channels of thought.

> "Thoughts shut up want air
> And spoil like bales unopened to the sun."

The influence of thought upon character is incalculable, for thought is the impelling force of every deed. "As a man's thoughts are, so is he" is a saying so old and well known as to scarcely need repeating. It is thought that distinguishes man from animal and civilization from barbarism, and it is thought that has produced the moral, scientific and economical development of the world. W.F.R.

Consult Tichener's *Experimental Psychology of the Thought Processes;* Pillsbury's *Psychology of Reasoning.*

**Related Subjects.** In connection with this article on thought the reader is referred to the following articles in these volumes:

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|---|---|
| Apperception | Judgment |
| Association, Law of | Logic |
| Attention | Memory |
| Brain | Mind |
| Concept | Perception |
| Feeling | Psychology |
| Imagination | Reason |
| Interest | Will |

**THOU'SAND ISLANDS.** See SAINT LAWRENCE RIVER, subhead *Thousand Islands.*

**THRACE,** *thrays,* the ancient name of an extensive region in the Balkan Peninsula. Its boundaries were somewhat vague, as it was subject to constant change, but it was situated to the north of Macedonia and possessed rich meadows and corn lands and had also great mineral wealth. At one time the territory is supposed to have extended from Macedonia to the Danube and eastward as far as the Black Sea.

The Thracians were of Indo-European origin, akin to the Phrygians of Asia Minor. They were barbarians, warlike and fond of plunder, and were ruled by many petty kings. After having been made nominally dependent on Persia the Thracians were subdued by Macedonia about 399 B. C. They regained their independence for a short time on the fall of Macedonia, but were conquered by the Romans, and Thra-

cia became a Roman province. Its most important towns were Abdera, the birthplace of Democritus; Sestos, on the Hellespont, celebrated in the story of Hero and Leander; and Byzantium, on the peninsula now occupied by Constantinople. Greece is generally supposed to owe the foundation of its music, mythology and philosophy to Thrace.

**THRASH'ER.** See Brown Thrasher.

**THRASH'ING MACHINE** (also spelled Threshing Machine). The thrashing engine ranks next in importance to the harvester among agricultural machines, and since the middle of the nineteenth century there has been about as much improvement in the one as in the other. The modern thrashing machine is a combination of three machines—the thrasher, the winnowing machine and the stacker—which are united in a single frame that is mounted on wheels so that the machine can be moved from field to field. The thrasher consists of an iron cylinder called the *beater,* to which vertical teeth are attached in rows, and a *concave,* which is a section of a similar cylinder with the teeth on its inner surface. These are so adjusted that they nearly touch the teeth of the cylinder. A feed board or grain conveyor receives the grain before it passes to the cylinder, and just back and a little below the cylinder is a grate, consisting of parallel steel slots against which the thrashed straw is forcefully thrown. Most of the grain falls through the slots to the grain conveyor, while the straw carrier, which has a vibratory motion for shaking out the remaining grain, conveys the straw to the stacker.

The grain conveyor carries the grain to the winnowing machine, where the grain is separated from the chaff and made to pass through a series of screens of different meshes to remove the inferior kernels and the seeds of weeds. The cleaned grain falls into a cylindrical box under the screens, called the *augur,* from which an elevator takes it to the weighing and measuring device. The grain may be placed in sacks or loaded into wagons as it comes from the machine. The stacker consists of a long tube connected with a blowing machine, which forces the straw up to the stack.

A modern thrashing machine requires a twelve or fifteen horse-power engine for its successful operation, and it will thrash from 1,200 to 1,500 bushels of wheat in a day. A machine with a grain conveyor cuts the bands and separates the grain in the bundles ready for the beater, so that bundles may be thrown directly from the stack or loaded upon it. The grain thrashed and cleaned pours from the elevator in a stream which fills bushel measures as fast as a man can empty them into a wagon.

Formerly steam engines were employed for operating thrashers, and a type that burned straw was very common in the great wheat-growing regions, but these engines are being replaced by internal-combustion engines.

In regions where the grain can dry on the stalk the combined harvester and thrasher, described in the article Reaping Machine, is used.

The most recent type of machine is that invented by Curtis C. Baldwin of Kansas. The machine goes to the grain instead of having the grain brought to it. As it moves through a field of standing grain, it blows a blast of air from revolving fans against the stems, forcing them against a toothed cylinder that beats out the grain and deposits it in a trough. Augurs elevate the grain to a second toothed cylinder, which beats it anew. The chaff is blown out, and the clean grain falls into sacks. Four horses pull the machine across the field, and a small gasoline engine operates the blasts and the beating devices. Two men are all that are required to operate it. The straw is left standing in the field, to be plowed under as fertilizer.

**History.** We read in the Bible that the Hebrews thrashed their grain by spreading it on hard ground or a floor and driving oxen over it. The Egyptians used a sort of sledge which was hauled over the grain, and the Greeks and Romans employed methods similar to those of older nations. The flail (which see) came into use in Northern Europe in the Middle Ages, and it was in general use among the early settlers of America until it was replaced by the thrashing machine. The thrasher, after which all later machines have been patterned, was invented by Andrew Meikle, a Scotch mechanic, in 1786. W.F.R.

Consult Conner's *Science of Threshing;* Davidson and Chase's *Farm Machinery and Farm Motors.*

**THREAD,** firmly-twisted fibers of cotton, flax or silk. Because of its cheapness cotton is more extensively used in the manufacture of thread than either silk or flax, and the long-fiber sea-island variety is the most valuable for the purpose. The supremacy of cotton in this field dates from 1794, when Samuel Slater began the manufacture of cotton thread in Pawtucket, R. I.

The process is very complicated. After the fibers are cleaned they are combed in carding machines until the tangles are smoothed out;

then they are rolled over and over to form thick coils of soft yarn. These coils are then placed in the drawing frame, where they are passed between sets of powerful rollers; in these rollers the cotton is drawn out and compressed into thin ribbons. These are fed to another machine, the doubling frame, where they are compressed into fine, delicate strips. Next, the strips are lapped, again drawn out, recarded to eliminate unevenness or other imperfections, and then wound upon bobbins. Several strands are twisted together and retwisted into a coarse cotton yarn, and this is finally spun by several progressive operations into the finished thread. The latter is either bleached or dyed, and is then wound on wooden spools for marketing. See COTTON; SPINNING.

**THREE RIVERS,** or, in French, **TROIS RIVIÈRES,** a city in Quebec, county town of Saint Maurice County. Three Rivers is situated on the north bank of the Saint Lawrence at its confluence with the Saint Maurice River. It gets its name from a third river, the Becancour, which empties into the Saint Lawrence from the south a short distance below the city. It is on the Canadian Pacific and Grand Trunk railways, ninety-five miles northeast of Montreal and eighty-seven miles southwest of Quebec. The famous Shawenegan Falls, twenty-three miles north, supply power for the city's manufacturing plants. These produce lumber, paper, iron pipe, machinery and tools of various kinds, and boots and shoes. Population in 1911, 13,691; in 1916, about 19,000.

Three Rivers is one of the oldest settlements in Canada. It was founded in 1634 by Laviolette, a lieutenant of Champlain. In 1775, at the beginning of the Revolutionary War, it surrendered to the Americans under Montgomery, and in the next year was the scene of one of the British victories which practically ended the possibility of adding a fourteenth to the thirteen revolting colonies.

**THRIFT.** This word, whether applied to plant life, individual human beings or to nations, means a substantial and vigorous growth. The word has no exact synonym. Frugality, development, prosperity—each conveys a shade of meaning that is a portion of thrift, but the word means more than any of these and includes them all.

Thrift is a condition—a condition implying both growth and progress. As applied to the individual, it is a habit that rises to the dignity of a virtue, for it not only adds to the material welfare of those persons who practice it, but it is contributary to the development of a strong and worthy character. We find it embodied in the philosophy of many of the world's most profound thinkers. In Holy Writ we find definitions of thrift that are applicable to modern times. For example:

> He becometh poor that laboreth with an indolent hand, but the hand of the diligent maketh rich.
>
> He that gathereth in summer is an intelligent son; but he that sleepeth in harvest is a son that causeth shame.
>
> A rich man ruleth over the poor and the borrower is a servant to the man that lendeth.
>
> Go to the ant, thou sluggard; look on her ways and become wise.

Cicero said, "Economy is of itself a great revenue." An old Latin proverb declared that "No gain is more certain than that which proceeds from the economical use of what you have." A couplet from Pope is as follows:

> To balance fortune by a just expense,
> Join with economy—magnificence.

Shakespeare declared "Thrift is blessing," and again he said, "I can get no remedy against this consumption of the purse; borrowing only lingers and lingers it out; but the disease is incurable." One of the very best definitions of thrift was given by John Wesley who said "Make all you can, save all you can, give all you can." One of the chief exponents of thrift was Benjamin Franklin, who through the plain philosophy of "Poor Richard" gave counsel on the value of thrift that will doubtless live as long as American literature is extant.

Simon W. Straus, New York and Chicago banker, president of the American Society for Thrift and organizer for the modern thrift movement in America, defined this virtue as follows:

> Money saving is not the sum total of Thrift. It is only one of the stones in the building of character. Thrift means much more than the saving of money. There is Thrift of character; Thrift of Time; Thrift of Health and Moral Thrift.
>
> A man is not thriftless who spends money, providing he can afford what he spends, and does his duty otherwise to humanity and society. A miser is an undesirable citizen and just as much a menace to humanity as a spendthrift.
>
> Thrift is submission to discipline, self-imposed. Thrift is denying one's self present pleasures for future gain. Thrift is the exercise of the will, the development of moral stamina, the steadfast refusal to yield to temptation.
>
> Money saving is only a function; it is thrift in its most elemental sense. But the thrift I preach is thrift in all things, and this is the thrift I hope will be taught in the schools of America. For this is the thrift that will give our beloved nation

the type of citizens she will need. From an economic standpoint, thrift is a national necessity.

Andrew Carnegie has emphasized the value of thrift in the following epigram: "The first thing that a man should learn to do is to save his money." From Lord Rosebery we learn that "Thrift is the surest and strongest foundation of an empire, so sure, so strong, and so necessary that no great empire can long exist that disregards it." To the same statesman we are indebted also for the following excellent, comprehensive definition:

> Whatever thrift is, it is not avarice. Avarice is not generosity—and, after all, it is the thrifty people who are generous. All true generosity can only proceed from thrift, because it is not generosity to give money which does not belong to you, as is the case with the unthrifty, and I venture to say that all the great philanthropists—all the great financial benefactors of their species, of whom we have any record, the most generous of all must have been thrifty men.

President Woodrow Wilson's idea of thrift is given as follows:

> If a man does not provide for his children; if he does not provide for all who are dependent upon him—and if he has not that vision of conditions to come, and that care for the days that have not yet gone, which we sum up in the whole idea of thrift and savings, then he has not opened his eyes to any adequate conception of human life. We are in this world not to provide for ourselves alone but for others, and that is the basis of economy—so that thrift and economy, and everything which ministers to thrift and economy, supply the foundations of national life.

In America, there has been for some time a popular misconception of thrift as applied to the individual. To be thrifty meant, in the minds of many, to be greedy, avaricious, miserly. However, as a result of the work of the American Society for Thrift, organized in 1913 by Simon W. Straus, a truer understanding of thrift became general. Organization of the society followed investigations made in several European countries by Mr. Straus, who received a commission from the United States government through the Bureau of Education to conduct these economic researches.

In the European countries visited, he found that thrift was the safeguard of the individual. In the face of a low earning capacity, even among the most poorly paid classes, thrift was practiced and money was saved, thus assuring the individual an income during the periods of unemployment, sickness and old age; and in the aggregate adding greatly to the potential power of a nation. These conditions contrasted sharply with the profligate ways of the prosperous American, and Mr. Straus, on his return from Europe, began at once the organization of the American Society for Thrift, which collected no funds and had for its purpose a purely educational propaganda.

In 1915, Mr. Straus was invited by the Panama-Pacific Exposition to preside at an International Congress of Thrift, to be held on the Exposition grounds. At this congress it was decided that the teaching of thrift in the public schools in the United States would lay a foundation for the practice of this virtue by future generations. A committee was appointed to wait on the National Education Association then holding its annual meeting in Oakland, Cal., and asked the coöperation of that body. The National Education Association took up the movement and delegated the National Council of Education, a subsidiary body, to prosecute the work. A committee, consisting of members of the National Education Association and the American Society for Thrift, was appointed as the Thrift Educational Committee, and they spent two years in research and investigation.

During the school years 1915-1916-1917 the National Education Association also held essay-writing contests on the subject of thrift in which cash prizes and medals were awarded. Over 150,000 American school children wrote essays in these contests. In the school year 1916-1917 an essay contest on thrift was inaugurated by the board of education of New York City, and over 400,000 pupils in the elementary grades of the schools of the American metropolis participated for cash prizes aggregating $1,000. These contests were held under the auspices of the American Society for Thrift.

The Thrift Educational Committee made a report to the effect that thrift, as a distinct and concrete branch of studies, could not be introduced into the already overcrowded curricula of the American schools, but that through correlation of those subjects which should exist as the basis of every good curriculum, it could be worked out. This resolution definitely committing the official school governing body of America to the policy of revising the curricula sufficient to include a thrift application to many branches, was introduced at the meeting of the National Council of Education in Portland, Oregon, July 7, 1917, by Simon W. Straus, president of the American Society for Thrift. Having thus committed themselves to this policy, the school authorities, through a subcommittee, appointed at their Portland meet-

ing, began at once to work out concrete courses of study. While the courses of study will vary with the various grades, the following summary may be taken as the basis upon which the science of thrift instruction is based:

**Arithmetic.** In the primary grades, problems are given the children for solution which show the value of saving; also the necessity of accuracy which implies truthfulness. In the intermediary grades the element of compensation and reward is introduced into the problems, while in the advanced grades, the value of investment is shown. A thrift application must be given to the entire range of mathematical studies, including bookkeeping, accounting and commercial practices.

**English.** This branch furnishes opportunities for the teaching of thrift to the children by means of story-telling, compositions and essays which include the memorizing of such fables as *The Farmer and the Wheat, The Ant and the Grasshopper,* etc. Stories and compositions on the life and works of the industrious insects and animals will show the value of coöperative and individual industry. The specific writing of essays on the subject of thrift will lead the children to research and thought on this subject without losing any value in diction, grammar or rhetoric.

**Geography.** The value of conservation can be taught in connection with this branch. The study of unused lands and wasted waterpower suggests the necessity of conservation. This also brings in gardening and forestry. The topography of a locality suggests the comparative value of industries and occupations. Domestic and foreign commerce as well as transportation and trade routes are rich in suggestion of the principle of thrift.

**History and Civics.** The value of coöperation may be taught through these branches, also through biography. The child may learn that the most successful careers were built primarily on habits of thrift. The lives of successful men, particularly those who have contributed to the substantial upbuilding of America, may be studied with interest and profit. A study of the decline and fall of nations brought about through the improvidence of their people, and a study of the healthful growth of those nations whose people are thrifty, may all be included.

**Hygiene.** This study suggests cleanliness, sanitation, care of the teeth, home ventilation, proper breathing, abundant use of pure water, care of the sick, emergencies, danger of narcotics. This study should bring out the actual loss incurred through ill health and unhealthful practices.

**Domestic Science** includes a study of the chemistry of foods, food selection, economic preparation of food, marketing, gardening and the preservation of food. It also includes sewing, which means the proper selection of fabrics and the saving of clothing through mending, darning and repairing.

It is suggested that in communities where thrift is not taught in the schools, parents may adopt plans by which a portion or all of this outline may be given to the child through home instructions.

To the individual wishing to take up practices of thrift, it is suggested that a definite record be kept of every penny earned and every penny spent. At the end of the month, go over these items and prepare a budget for the succeeding month which will, if possible, include the elimination of such expenditures as are considered unnecessary or wasteful. Make it a definite point also to save systematically; lay aside from your earnings a fixed sum daily, weekly or monthly. Make the amount small enough so that there will not be grave danger of becoming disheartened. It will be found that the saving habit becomes a most fascinating one after one has begun it. S.W.S.

Consult Smiles' *Thrift.*

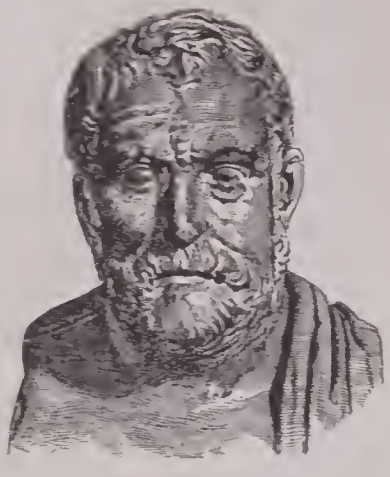
**THRUSH,** a group of song birds found all over the world. There are about 240 species, including numerous plain brown birds, with whitish and usually spotted breasts, besides the robins, wheatears and bluebirds. Thrushes are migratory. They inhabit wooded regions, spending much time on the ground and feeding almost entirely upon insects, thus proving themselves of value to man. They are the highest order of songsters.

O thrush, your song is passing sweet,
But never a song that you have sung
Is half so sweet as thrushes sang
When my dear love and I were young.
—MORRIS: *Other Days.*

The largest and best known North American species, barring the American robin, is the *wood thrush,* which has bright cinnamon upper parts, and conspicuously spotted breast and sides. It is noted for its clear, flutelike song. The wood thrush nests in the Northern United States and winters in Central America. Its nest, built on the horizontal branch of a bush or tree, consists of leaves, twigs, etc., closely woven together and having an inner wall of mud and a lining of fine rootlets. The eggs are three to five in number and of a greenish-blue color. Other common species are the *Wilson's thrush,* or *veery,* the *hermit thrush* and the *bluebird.* In England, the commonest thrushes are the *redbreast,* or *English robin,* the *throstle,* or *song thrush,* and the *nightingale,* the sweetest singer of all the thrushes.

Consult Forbush's *Useful Birds and Their Protection.*

**THUCYDIDES,** *thu sid'i deez,* a Greek historian of the fifth century B.C., celebrated as the first historian to write from a critical standpoint. His great masterpiece, *A History of the Peloponnesian War,* is divided into eight books, the last of which concludes abruptly and bears evidence of not having been carefully revised. The narrative covers twenty-one of the twenty-eight years of the war, the period from 431 to the middle of 411 B.C. It is a terse, impartial record of the conflict, and a striking testimony to the author's painstaking efforts to obtain and present accurate information. As the events are given according to the record of each summer and winter, they are not always properly grouped, but on the whole the history is one of the best available sources of information on that period. The author is admired, too, for his skill in analyzing characters and his ability to show the relation between cause and effect.



THUCYDIDES

Thucydides was born in Attica. He came of an aristocratic and wealthy family, and was the possessor of rich Thracian gold mines. During the Peloponnesian War, in 424 B.C., he was in command of part of the Athenian fleet, but his failure to relieve the siege of Amphipolis made him an exile for twenty years. He returned to Athens in 403 B.C., shortly after the close of the war, and it is supposed that he died two or three years later.

**THUGS,** the name commonly applied in America to "holdup" men or highwaymen. The word is from the Hindustani *thag,* meaning a *cheat* or *rascal,* and was first applied to a religious society in India whose members committed murders and plundered victims in honor of Kali, the patron goddess of the thugs. According to legend they formerly believed that Kali assisted them in disposing of the bodies of their victims by devouring them, but when one of the fraternity became curious and pried into the proceedings of the goddess she became angry and condemned them in the future to bury their victims. The native Indian and the English governments have tried to suppress thuggee—the practice of the thugs—at various periods, and in 1831 the British authorities adopted strenuous measures to put an end to the evil. It is now practically wiped out.

**THULE,** *thu'le,* or, more commonly, ULTIMA THULE, the name usually given in ancient literature to the most northern of lands. Some writers say that Iceland was meant, others that the name was given to one of the Shetland Islands.

**THURS'DAY,** the fifth day of the week, literally *Thor's day,* sacred to the ancient Scandinavian or Teutonic god of thunder. This is probably a translation of the Latin *dies jovis,* meaning *Jove's day,* Jove or Jupiter being the corresponding Roman god. In the United States the last Thursday in November is celebrated as Thanksgiving Day. Maundy Thursday, also called Holy Thursday, is the day preceding Good Friday. See THOR.

**THWAITES,** *thwayts,* REUBEN GOLD (1853-1913), an American historian, born at Dorchester, Mass. He attended the high school, but his college work, in preparation for a post-graduate course at Yale, he did by himself. In 1866 he went to Wisconsin, and ten years later was made managing editor of the *Wisconsin State Journal,* at Madison. From 1886 until his death he was secretary and superintendent of the State Historical Society of Wisconsin, and editor of its publications. Among his published volumes are *Down Historic Waterways; The Story of Wisconsin; The Colonies, 1492-1750; On the Storied Ohio; Stories of the Badger State* and biographies of Daniel Boone, Marquette and George Rogers Clark. Besides his part in making the Wisconsin State Historical Society efficient beyond those of many other states, his greatest work was the editing of the seventy-three volumes of *Jesuit Relations.* This is considered by authorities one of the most excellent examples of scholarship ever shown by an American historian.

**THYME,** *time,* a fragrant garden herb belonging to the same family as the mints. Its scent is due to an oil contained in the leaves and stems, from which is prepared the drug thymol. In Europe thyme is cultivated for use as a flavoring. The plant grows from six to ten inches high, and has square, hairy stems, narrow leaves and small lilac or purplish flowers, borne in separate whorls. A variety known as *creeping thyme,* with woody, branching stems, makes an admirable cover for rocks and waste places. There is an old tradition that at midnight in midsummer the king of the fairies and

his followers frolic in beds of wild thyme. Oberon, king of the fairies in Shakespeare's *Midsummer Night's Dream,* says:

> I know a bank whereon the wild thyme blows,
> Where ox-lips and the nodding violet grows.

**TIAN-SHAN,** *te ahn' shahn',* **MOUNTAINS,** an extensive mountain system of Central Asia, commencing in Russian Turkestan and extending nearly 1,500 miles in an easterly direction to the Desert of Gobi. It is closely connected with the Atlas system and forms the great barrier which divides the watersheds of Balkash and Dzungaria. The system consists of a series of ranges running parallel to each other, with a breadth of about 200 miles. The highest peak is Khan-Tengri, rising 2,400 feet above sea level. To the westward of Khan-Tengri the Tian-Shan range divides into several portions, one of which extends through the Pamir and joins the Hindu Kush and the Himalayas.

There are numerous roads and passes over the mountains, connecting China, West Turkestan and Persia. These routes are extremely dangerous in winter, owing to the vast accumulation of snow. In this region the snow line is from 11,500 to 12,500 feet above sea level; all peaks above that height are snow clad, and have numerous glaciers many miles in extent. The mountains contain vast mineral wealth almost entirely undeveloped.

**TI'BER,** the historic stream on which lies the city of Rome, called in ancient writings "Father Tiber" and the "Yellow Tiber." The former name suggests the affection with which the Romans regarded it; the latter refers to the color of the water, whose swift current carries down stream great quantities of sand and mud. This sediment, deposited century after century at the mouth of the river, has built up the land until at the present time the harbor is four miles farther out than in the days of ancient Rome.

The Tiber is the second largest river of Italy, ranking next to the Po. It rises in Tuscany, in the Apennines, and after a winding course of 245 miles empties into the Tyrrhenian Sea (an arm of the Mediterranean) about twenty-six miles below Rome. It enters the sea by two branches, one of which is a channel excavated by the emperors Claudius and Trajan. These two arms surround an unhealthful island known as the Isola Sacra. The Tiber in times past has frequently overflowed its banks and caused great devastation, and costly embankments constructed at Rome have only partially averted this peril. In 1900 one of the most disastrous floods in its history occurred. Under normal conditions the river is navigable for small steamers as far as Rome.

**TIBERIUS,** *ti be'ri us* [TIBERIUS CLAUDIUS NERO CAESAR] (42 B. C-A. D. 37), the second Roman emperor, the son of Tiberius Claudius Nero, an officer under Julius Caesar, and Livia, who afterwards was the wife of Augustus. His mother used her powerful influence to secure the advancement of Tiberius and his younger brother Drusus, and the former won considerable distinction in the army, carrying on successful campaigns in Germany and Gaul. Tiberius was compelled by Augustus to divorce his wife, Vipsania Agrippina, to whom he was devoted, and to marry Julia, the emperor's daughter. For a time after this he lived in seclusion at Rhodes, but he returned in A. D. 1 and again took charge of the army. Although he had no affection for Tiberius and felt little confidence in him, Augustus adopted him and designated him as his successor, and in A. D. 14 Tiberius came to the throne.

TIBERIUS

From a bust in the Museo Nazionale, Naples.

Augustus, lacking a male heir, first adopted his younger stepson, Drusus, who died 9 B. C., owing to a fall from his horse. In A. D. 4 he adopted Tiberius, and was succeeded by him as emperor in A. D. 14.

Like so many of his successors, Tiberius at first governed well, and throughout his reign all the provinces of the empire were especially prosperous. In Rome, however, he showed a growing suspiciousness and cruelty. Spies were stationed everywhere to report any opposition to the emperor, and all who were even under suspicion were punished with death. Postumus Agrippa, grandson of Augustus; Germanicus Caesar, the popular nephew of Tiberius; Tiberius' own son, Drusus Caesar—all were put to death because the emperor feared them; and his own death at Capri at the hands of Macro was but the final act of violence of the reign.

Tiberius was a man of undoubted genius, clear of judgment, tenacious of purpose; but he was cold, unloving and fond of shrouding all his acts in mystery. Thus he became hated

by the people, and the accounts of him which remain are doubtless darker than his real character would warrant.

**Named in the Bible.** Tiberius is mentioned once in the Bible, and the fact serves as a connecting link between so-called scripture and profane history of the period. In the gospel of *Luke* III, 1-3 is the statement that in the fifteenth year of Tiberius the word of God came to John the Baptist. It is known from other sources that John was then about thirty years old and that Jesus was only six months younger; this mention therefore serves as important data for determining the time of the birth of Christ. A.MC C.

For the part played by Tiberius in the line of emperors, see ROME, subhead *History*.

**TIBET,** *ti bet'*, a great expanse of country nominally a part of China, but in reality possessing almost an independent government. It has been aptly called "the roof of the world," for it is the most elevated large area on the globe; the whole country is a plateau, broken by a few river valleys near its borders. It is as large as that part of the United States east of the Mississippi River and north of Tennessee; however, because of physical conditions the country contains fewer inhabitants than the single state of Massachusetts.

The map opposite page 416 in these volumes tells at a glance something of the story of Tibet. At the south the Himalaya Mountains send heavenward the tallest peaks in the world; the Brahmaputra River, in Tibet called the Tsanpo, has to flow over a thousand miles eastward and around them to find its Indian outlet to the sea. On the north and northwest the Kuen-lun range sends some of its peaks to a height of 20,000 feet. Enclosed thus on three sides by towering walls, the surface of Tibet has an average elevation of fully 12,000 feet; the lowest, in the east, is 9,000 feet, and the highest, in the southern part, about 17,000 feet. In the west the altitude is 12,000 to 14,000 feet.

**The People.** The facts related above explain in large measure why Tibet contains so few people. When it is further stated that the mountains limit the rainfall to a very few inches a year and that thousands of square miles are a dreary expanse of sand and gravel, over which violent winds blow at all seasons, it is difficult to understand how even three and a half million people can live there. Two-thirds of the people live in the southern part, in the Brahmaputra valley, with the frowning Himalayas at their back; most of the others live in the northeast, near the great lake of Kuku-Nor, which is elevated a mile and two-thirds above the sea. There are hundreds of other lakes, but they are in dreary surroundings, and most of them are salty, because of absence of rain.

LOCATION MAP
Tibet comprises a large but comparatively unimportant part of China.

The people have not been greatly influenced by their surroundings, for they are cheerful, and strangers find them friendly. They smile and stick out their tongues when they meet, for that is their cordial salutation. Cloth is hard to get, but as the climate is cold—freezing weather occurs even in midsummer—they dress comfortably in sheepskin, although one cloth garment, a great woolen coat, is much worn. Nearly all the cloth is homespun.

*Their Religion.* Tibetans are very religious, and this may partially explain their contentment. They profess Lamaism, an offshoot of the Buddhist faith. Raising large families and increasing the number of households is a serious matter because of the difficulty of making a living, so thousands of young men and women become monks and nuns. The monks are called *lamas,* and Tibet holds half a million of them. These lamas dress in long robes of yellow or purple. Among the people who marry the system called polyandry exists; one woman will often marry from two to half a dozen men—usually all the brothers of one family. The people live in rude houses of mud and stone.

**Resources.** It is possible to live but a few months of the year in the high altitudes; while there the people raise sheep and yaks, and these they drive lower down when the short warm season is over. In the valleys there is vegetation, but it is not plentiful enough to meet the demands of the population. Barley is the staple crop, for it will grow in cooler climates than any other grain except rye, and it is the principal foodstuff. There is some mining, gold, silver, iron and copper being found.

**Government.** Because it is inaccessible, Tibet is difficult to govern from Peking. The authority of China is felt but slightly in the province, and the people appear to care little what happens to the remainder of the republic; in-

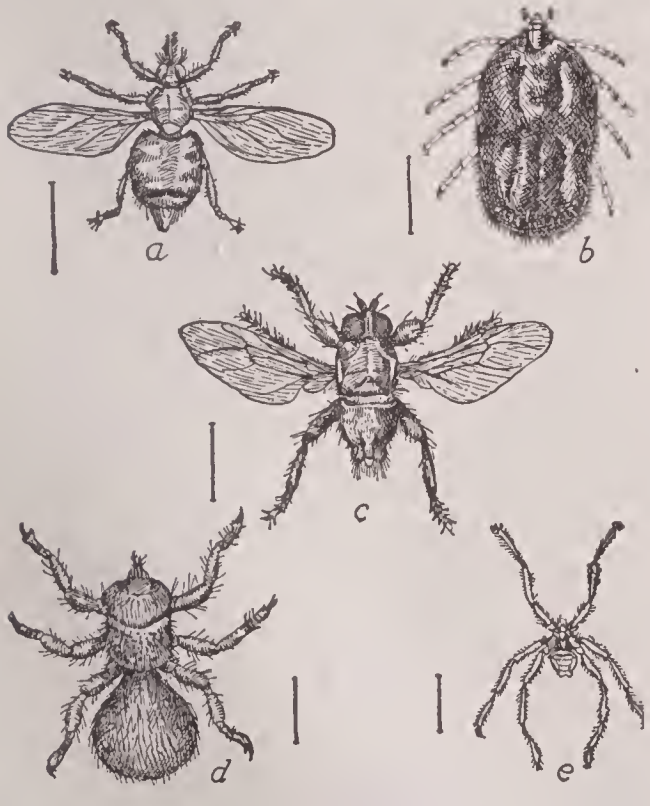
deed, they have declared their desire to be independent. They live largely unto themselves. The local authority is the *dalai lama,* a term which means *grand lama;* he rules from the capital, Lhasa, known to the outside world as the "Forbidden City," because to its most sacred precincts white people are not permitted to penetrate. E.D.F.

Consult Holdich's *Tibet the Mysterious;* Hedin's *Adventures in Tibet.*

**Related Subjects.** In connection with this article the reader may refer to these topics:

| | |
|---|---|
| Brahmaputra | Kuen-lun Mountains |
| Himalaya | Lamaism |

**TIC DOULOUREUX,** *tik doo loo roo',* a French expression meaning *painful twitching,* is the name of an acute form of facial neuralgia, often brought on by a diseased tooth, cold, or nerve inflammation or degeneration. There are usually shooting pains on one side of the face, which often recur every day at the same hour. Warm applications or electrical treatment with iodides will sometimes relieve the pain; but it may be necessary to remove a part of the nerve. See NEURALGIA.




TICKS

The illustrations show ticks found on (*a*) birds; (*b*) cattle; (*c*) horse; (*d*) sheep; (*e*) bat. The perpendicular lines indicate actual adult sizes. All except *b* are shown in their immature stage, when they have but six legs.

**TICK,** the popular name of several varieties of tiny eight-legged parasites which attack mammals and birds. The head, chest and abdomen are all in one, and the mature insect is oval, with a flat back and leathery covering. Although found in plants when young, the large ticks attach themselves by their mouths to the soft flesh of mammals and birds, and they live on the blood of their victims, growing large, round and red. Only the females, so far as zoölogists know, suck the blood. The only thing which can be said in their favor is that one species eats grasshoppers' eggs. One of the eight species of cattle ticks occurring in America is responsible for Texas cattle fever, and all spread disease. A Persian variety, which attacks men at night, is said to cause death by its bite. Ticks belong to the same class as mites, scorpions and spiders (see ARACHNIDA).

**TICONDEROGA,** *ti kon der o' ga,* BATTLES OF. Ticonderoga, a village in Essex County, N. Y., is historically important as a battle ground in

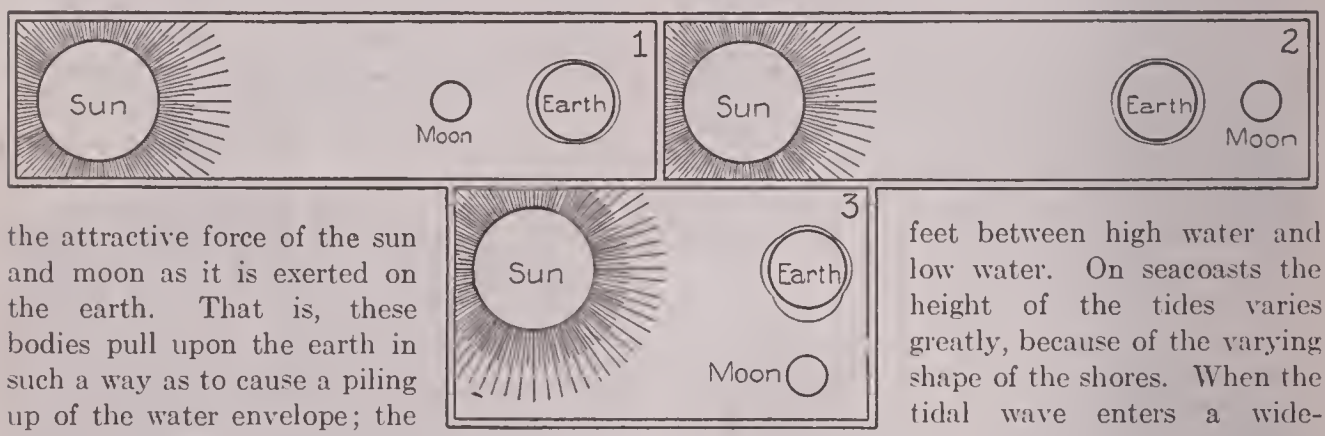
RUINS OF OLD TICONDEROGA

three wars. It is situated in an agricultural and rich graphite region, between lakes Champlain and George, 100 miles northeast of Albany. In 1910 it had a population of 2,475. In 1915 the population was 2,918 (state census).

The first battle in the vicinity was fought in 1609, when Samuel Champlain, the French explorer of Quebec, won a victory over the Mohawk Indians. After the outbreak of the French and Indian War, in 1755, the French built a fort near the village, which was attacked in July, 1758, by the British under General Abercrombie. In 1759 the fort was besieged and captured by a British force under General Amherst. One of the first movements in the Revolutionary War was the dispatch of an American expedition against Ticonderoga, and on May 10, 1775, the fortress was captured by Ethan Allen without the loss of a man. When the British commander demanded of Allen by what authority he claimed its surrender, he uttered the now famous reply, "In the name of the Great Jehovah and the Continental Congress." The fort was retaken by Burgoyne's forces in

1777, but was later abandoned. The ruins of the barracks and fortifications are still to be seen.

**TIDES,** the periodic rise and fall of ocean waters, observed on most seacoasts twice a day. Centuries ago, before many of the familiar facts of astronomy and physical geography were known, these daily movements of the ocean were watched and studied, and the reason for the phenomenon was eagerly sought by the wise men. It was a problem, however, that baffled philosophers until the seventeenth century, when Sir Isaac Newton furnished the key to the solution with his theory of gravitation. According to this principle, every particle of matter in the universe during every instant of time is attracting every other particle. Tides are caused by the attractive force of the sun and moon as it is exerted on the earth. That is, these bodies pull upon the earth in such a way as to cause a piling up of the water envelope; the effect on the solid earth is, of course, not discernible, for the land envelope acts as a rigid body and does not perceptibly yield to the pulling force, although the force is present. It is as constant and unalterable as the force of gravitation.




CAUSE OF TIDES

(1) The attraction of the sun and moon in conjunction; (2) sun and moon in opposition; (3) moon in quadrature.

The course of the daily tide is as follows: There is a gradual rise for about six hours, and then the water remains stationary for a short time. Then it begins to recede and continues to fall for the succeeding six hours. The highest stage is called *high tide,* and the lowest, *low tide.* The landward movement is called *flood tide,* and the receding one, *ebb tide.* These terms have been applied to the wave movements as observed on shores, for it is difficult to distinguish the tides out in the open sea. On every portion of a coast there are two high and two low tides within a little more than a solar day, the interval between two successive high tides being about twelve hours and twenty-six minutes. At different times in the year the hours of high and low tides vary slightly.

In respect to the formation of tides the moon is more important than the sun, because it is so much nearer the earth than is the larger body. When the sun and moon are pulling in the same straight line, as at full moon or new moon, the effects of the solar high tide are added to those of the lunar high tide, and the result is a tide higher than the average. Such waves are called *spring tides.* At the same time there is a corresponding low ebb tide. When the sun and moon act at right angles, the solar high tide occurs at the same point as the lunar low tide and prevents the latter from being as low as usual; the solar low tide, on the other hand, lessens the force of the lunar high tide. These moderately high and low tides are called *neap tides.*

As has been stated, the tidal waves in the open ocean are hardly noticeable, for in mid-ocean there is a difference of only about three feet between high water and low water. On seacoasts the height of the tides varies greatly, because of the varying shape of the shores. When the tidal wave enters a wide-mouthed channel or estuary converging inland, the waters pile up as they pass the narrowing shores, and a rushing stream called a *bore* is formed. In the Bay of Fundy the tidal wave sometimes reaches a height of sixty feet. Bores also occur in the Amazon, the Ganges, in numerous estuaries of the British Isles, and in other places. Such tides are often very dangerous to sailing vessels. Another phenomenon of tide waves is the *tidal race,* formed when the tide rises to different heights in two bodies of water joined by a narrow channel. Sometimes the force of such a current renders navigation very dangerous.

Tides are of value in keeping the otherwise stagnant waters of bays and harbors in movement. Large steamers usually leave port at high tide; some landlocked harbors have so shallow an entrance at low tide that all vessels must wait for the flood before they can pass over the bar. Mariners' charts, which show the variations in tide for all harbors, are compiled for the convenience of navigators and these are carried by all tide-water vessels. E.B.P.

Consult Wheeler's *Practical Manual of Tides and Waves;* Ball's *Time and Tide.*

**TIE,** in music, the name given to a slightly-curved line which connects two like notes or tones. They are then played or sung as one. See page 4025.

**TIEN-TSIN,** *te en' tseen',* a Chinese city in the province of Chi-li, first opened to foreign trade and settlement by a treaty negotiated in 1860, and now one of the busiest ports in the country. It lies on the Pei-ho where that river meets the Grand Canal, and is about seventy miles southeast of Peking (see map of Asia, opposite page 417). Surrounded by walls of brick and stone, and with dirty streets and unattractive brick or mud dwelling houses, native Tien-tsin is still typically Chinese. The foreign settlement, however, which is known as Red Bamboo Grove, is a modern European city, with a fine driveway along the river, good streets, gas and electricity, attractive homes and public buildings, and schools, hospitals and clubs. This section is situated about a mile and a half below the Chinese city, and is the center of important business interests. Population, 800,000.

Tien-tsin has railway connections with Peking, the coal district of Kaiping, Manchuria, and Hankow (by way of Paotingfu and Chingting). The import and export trade is very large, both with foreign and domestic ports. Exports include straw braid, furs, hides, camels' wool, tobacco, wood and coal, and the imports, woolen goods, jeans, sugar, rice, grain, petroleum, tea, opium, paper, steel and salt. The caravans engaged in transporting tea to Asiatic Russia made Tien-tsin their starting point.

**TIERRA DEL FUEGO,** *tyer'rah del fwa'go,*

TIERRA DEL FUEGO

an island group lying off the southern extremity of the South American continent, from which it is separated by the Strait of Magellan. The archipelago was discovered in 1520 by Magellan. These islands have a total area of about 27,000 square miles, but over four-fifths of this territory is included in the area of one large island, sometimes known as King Charles South Land, but more generally as East Tierra del Fuego. The archipelago is divided politically into two sections, one the possession of Argentina and the other of Chile. The Argentina portion consists of the eastern part of the main island and Isle de los Estados, or Staten Island, an isolated island on the extreme east. The rest of the archipelago belongs to the Chilean Territory of Magallanes.

The small islands constituting the Chilean division end at the extreme south in Horn Island, on the southern end of which is the famous cape called by the sailors "the Horn." The principal town of the Chilean section is Punta Arenas (population 10,500), the world's southernmost city.

**TIFFIN,** *tif'in,* Ohio, the county seat of Seneca County, situated west of center in the northern part of the state, forty-two miles southeast of Toledo. It is on the Sandusky River and on the Baltimore & Ohio, the Cleveland, Cincinnati, Chicago & Saint Louis and the Pennsylvania railroads. An electric interurban line extends west to Fostoria. The population, which is more than forty per cent German, was 11,894 in 1910; it was 12,867 in 1916 (Federal estimate).

Tiffin has Heidelberg University, Ursuline College, a Federal building completed in 1916 at a cost of $200,000, a Carnegie Library and the National Orphans' Home of the Junior Order of United American Mechanics. Convenient deposits of clay and glass sand furnish materials for potteries and glassworks. Among the industrial plants are manufactories of furniture, wagons and carriages, elevating and hoisting machinery, nuts and bolts, sanitary ware, stoves and mittens. The adjacent country is agricultural and brings the city a large trade. Tiffin was settled in 1817, incorporated in 1835 and made a city in 1836. H.K.C.

**TIFLIS,** *te flees',* a trade center of Russian Transcaucasia, of which it is the seat of government. It is situated in a beautiful valley of the Caucasus Mountains, on the Kur River. The Caspian seaport of Baku lies 340 miles to the southeast. In the Russian section there are fine public buildings, modern shops

and handsome churches, but the native quarter is typically Oriental. The city is a manufacturing center of cotton and woolen goods, felt, carpets, tobacco, oil and other commodities, and is a market for a fertile agricultural region. Among the important institutions are a museum of natural history, which has a library connected with it, a museum of silkworm culture and large botanical gardens. There is railway connection with Poti and Batum, ports on the Black Sea, and with cities in interior Russia. In the vicinity there are numerous sulphur springs. Tiflis was formerly the capital of the independent kingdom of Georgia, which came under the control of Russia in 1799. Georgians and Armenians make up most of the population, which numbered 307,300 in 1913.

**TIGER,** a lithe, beautifully-marked jungle cat of Asia. For strength and fierceness it has only one rival, the lion; while for cruelty and treachery it probably has none. Rudyard Kipling, in his *Jungle Books,* makes a scarred tiger, Shere Khan, the outlaw of the jungle; he killed not only for need of food but also for love of blood, and was feared by all the other animals for his viciousness and cruelty, and despised for his treachery. The story is highly imaginative, although it probably presents a fairly accurate interpretation of tiger nature.

In size, in the structure of the skeleton, in teeth and claws, the lion and the tiger are much alike, but there the resemblance ceases. The tiger has no mane and it cannot roar. Its coat is not dull fawn, but is bright fawn in

HEAD OF THE TIGER

color, shading to white underneath and beautifully marked with irregular stripes of black. The largest tigers are found in India; those in Southern Siberia, Turkestan, Persia, China and Japan, and those on the islands of Java and Sumatra, are smaller. The Indian tiger is sometimes as much as ten feet long from the tip of the nose to the tip of the tail, and its coat is very glossy and brilliant; the tigers of colder regions have a thicker, rougher fur, which is much duller in color.

The tiger is a carnivorous (flesh-eating) animal. In India its principal food consists of deer, wild pigs, antelope, young buffalo—for even the tiger fears the powerful old bulls—and cattle, to the number of about 32,000 in a year. The terrible "man-eaters," who have been known to kill as many as 130 natives in one year in India, are not the young, fierce beasts, but are old tigers whose first vigor has departed and whose teeth are so worn that they find men even easier to kill than domesticated cattle. Sometimes a whole district will be deserted if a man-eater invades it, for attempts to destroy tigers by traps, pitfalls, spring guns or poisoned arrows are not very effective.

The tiger usually hunts at night, unless it is ravenous, on which occasions it becomes extremely bold and will kill in daylight. It will climb trees occasionally, and it swims easily and readily. It is reported that tigers will even swim from one island to another in search of a better hunting ground. The mother tiger is very affectionate and often keeps her cubs, from two to six in number, with her until they are nearly two years old. As soon as they can no longer live on her milk she takes them out into the jungle and teaches them to kill for themselves. Once they have learned to provide their own food, the cubs are abandoned by the mother, who may eat one of them at a later date when food is scarce.

**How Tigers Are Captured.** Because tigers have their lairs in the jungle, where the grass and undergrowth are very high and dense, they cannot be successfully hunted on foot. Natives are sent out on foot to "beat" the bush and drive the tigers out of their hiding places into the open, where they are shot by white hunters mounted on elephants. Both beaters and elephants are mortally afraid of the tiger, for even the elephant's thick skin is not proof against the terrible claws of the great cat. This sort of big game hunting is exciting and dangerous, for a wounded tiger sometimes springs upon the elephant's back to attack the hunters in the *howdah,* or cage. A much safer method is to tether a goat or some other live bait in a place where tigers may be expected, and then to shoot it from a platform erected on poles or in a near-by tree. Tigers for zoos are caught by nets spread in their paths, or are trapped in grass-covered pits.

The tiger's average length of life is twenty-five years. A.C.

Consult Eardley-Wilmot's *Life of a Tiger;* Mockler-Ferryman's *Life Story of a Tiger.*

**TIGER LILY,** a tall garden plant, native to Eastern Asia and believed to be the first lily brought to America. It was so named because its reddish-orange blossoms, splashed with black, suggest the color and markings of the tiger. The plant is produced from bulbs which are used for food in China and Japan. Its greenish-purple or dark brown stem, often reaching a height of five feet, bears alternate lance-shaped leaves, deeply veined from tip to base. At the point where they join the stalk tiny black bulblets appear, which cling to the stem for a time, but finally drop off, producing other plants. See LILY.

THE TIGER LILY

**TIG'LATH-PILESER,** *pi le'zer,* according to the Old Testament, the name of several Assyrian kings.

**Tiglath-Pileser I,** whose reign began about 1120 B. C., was a powerful ruler. He made conquests in Northern Syria, Cappadocia, Persia, Armenia and Kurdistan, and even entered the city of Babylon. Much of his time was occupied in constructing palaces and temples and beautifying the city of Assur, on the Tigris River, which he made his capital. His successor of the same name ruled about 950 B. C.

**Tiglath-Pileser III,** the most important of the name, was remarkable for his power, and ruled over Assyria from 745 to 727 B. C. Being an able political organizer as well as a strong conqueror, he gained the good will of the Babylonians by checking near-by tribes who had been troubling them, and by establishing Assyrian colonies in hostile territories, thinking that a more profitable scheme for gaining control than the ordinary methods of invasion by force. Frequent revolts in Northern Syria occupied much of his time. Events connected with the assistance he lent to Ahaz, king of Judah, in conquering Damascus are chronicled principally in the fifteenth and sixteenth chapters of *II Kings.* In 728 B. C. he was crowned king of Babylonia, but died the following year, leaving the empire to his son, Shalmaneser IV.

**TI'GRIS,** a river of Asiatic Turkey, which, with its sister river, the Euphrates, formed the ancient valley of Mesopotamia. Within this valley, according to tradition, was located the Garden of Eden, and on one of its heights the Ark of Noah is said to have rested. In Assyria and Babylonia, in the southern part, there developed two great civilizations of the ancient world, both of which flourished long before Greece and Rome came to power. The ruins of the ancient city of Nineveh, capital of Assyria, lie on its left bank, opposite the modern town of Mosul (see NINEVEH).

The Tigris rises from two main sources which drain the region south of the Taurus Mountains. The main stream follows a winding southeasterly course to Garmat Ali, and at this point unites with the Euphrates. The sister rivers then flow as one—the Shat-el-Arab—to their mouth on the Persian Gulf, seventy miles beyond. Formerly the town of Korna, thirty miles above Garmat Ali, was the junction point, but the channel of the Tigris has been undergoing a change for many centuries.

Among the towns on its banks are two which figured prominently in the War of the Nations—Bagdad and Kut-el-Amara, the latter halfway between Bagdad and Korna. At Kut-el-Amara, in the spring of 1916, a British garrison was starved into surrendering to the Turkish forces, but in February, 1917, a British relief expedition recaptured this town, and in March took possession of Bagdad. The Tigris-Euphrates Valley was the scene of much desperate fighting. The total length of the Tigris is about 1,150 miles. It is navigable for steamers to a point about thirty miles south of Mosul, near the mouth of the Great Zab.

**TIL'DEN,** SAMUEL JONES (1814-1886), an American lawyer, statesman and philanthropist, the opponent of Rutherford B. Hayes in the most closely contested Presidential election in the history of the United States. He was born at New Lebanon, N. Y., and was educated at Yale College and at the University of the City of New York, graduating from the latter

in 1837. After studying law he was admitted to the New York bar three years later, and rapidly gained success in his field. As a member of the state legislature in 1846 he encouraged the building of canals by the state. For two successive years Tilden was a member of the State Constitutional Convention, and served a second term in the New York legislature. He figured prominently in exposing the graft and frauds of the famous Tweed Ring (see TWEED, WILLIAM MARCY), and gained such popularity that he was elected governor of New York (1875-1876), and was a Democratic candidate for President in 1876.

SAMUEL J. TILDEN
Millions of Americans believe he was elected President of the United States in 1876.

In this election there were said to be frauds in the elections of South Carolina, Florida and Louisiana, and the settlement of the question by an electoral committee resulted in a vote of eight to seven, giving the election to Rutherford B. Hayes, Tilden's opponent. (For full details of this episode see the article ELECTORAL COMMISSION.) In 1880 and again in 1884 Tilden was offered the Presidential nomination, but he refused it on both occasions. The greater part of his fortune, estimated to be $5,000,000, was bequeathed as a foundation for a public library in New York. The will was contested, and only about $2,000,000 was used for the purpose.

Consult Bigelow's *Samuel Jones Tilden;* Haworth's *The Disputed Election of 1876.*

**TILE'FISH,** a genus of deep-sea fish first discovered in 1879 by fishermen engaged in cod trawling near Nantucket. These fish were seen again in 1880 and in 1881, and specimens were examined with great interest by the United States Fish Commission, which reported their flesh to be excellent food. The name *tilefish* is an abbreviated form of a long scientific name, meaning the *crested tilus with a head like a chameleon.* (A comparison of the accompanying illustration with that on page 1264 in the article CHAMELEON will prove interesting.) Large specimens are about three feet long and weigh about thirty pounds. The genus was almost exterminated in 1882, when immense numbers of dead fish appeared on the surface of the water south of Long Island. It is supposed they perished in cold-water currents forced southward by the heavy spring gales of that year. Special efforts were made to find surviving specimens and to propagate the fish, and as a result the genus has been reëstablished and is increasing in numbers.

The United States government is endeavoring to make the capture of these fish an important branch of the fishing industry, because of their superiority as a food fish. Fishing is carried on in dories, small, strong boats which are thoroughly seaworthy, and are carried by larger sailing vessels. Each dory is manned by two sailors, who row it out a mile from an anchored buoy, to which is attached a mile of

THE TILEFISH

fishing line having a thousand hooks. A ton and a half is considered an average catch for a sailing vessel. Before they are brought to land the fish are cleaned and packed in ice.

**TILES,** flat, curved or tubular pieces of baked clay, used for covering roofs, mantels, floors and walls, as furnace linings and in the construction of drainage pipes. Coarse, rough clay is generally employed in making the tiles for drainage pipes, and the pieces are tubular or semitubular. A continuous pipe is made by overlapping the separate tiles, each of which has an extension at one end for the purpose. Roofing tiles are of various shapes and colors, and are used very effectively in modern architecture. Wall tiles are made of fine grades of clay, and sometimes of porcelain. Very charming effects are attained by the use of tiles of different colors, harmoniously and artistically arranged. *Encaustic* is the trade name for decorative tiles used in such a way that there is a main ground of one color and an inserted pattern of a contrasting color. Small, unglazed tiles in plain colors, combined to form a design, are called *mosaics.* White polished tiles are popular at the present time for walls and ceilings of kitchens and bathrooms.

**TILLEY,** *til'i,* Sir Samuel Leonard (1818-1896), a Canadian statesman, at various times premier of New Brunswick, lieutenant-governor of that province, and Minister of Finance in Sir John A. Macdonald's Cabinet. While holding this last position he was the author of the law providing a protective tariff as a part of the "national policy" of the Conservatives. This policy has remained the basis of Canadian finance to the present time.

Sir Leonard, as he was commonly known, was born at Gagetown, N. B. His first political appearance, as member of the provincial assembly, was in 1850. He grew steadily in influence, and from 1860 to 1865 was premier. In the discussion and negotiations leading to the organization of the Dominion, he was a leading advocate of confederation. In Macdonald's first Ministry, ending in 1873, Tilley held various offices, and in the second Ministry, from 1878 to 1885, he was Minister of Finance. In the interval from 1873 to 1878, and again from 1885 to 1893, he was lieutenant-governor of New Brunswick.

**TILLMAN,** *til'man,* Benjamin Ryan (1847- ), an American politician, born in Edgefield County, South Carolina. His school days at Bethany Academy, in West Virginia, were interrupted when the War of Secession broke out, and the boy enlisted in the Confederate army. His services were soon ended, however, by a severe illness which lasted for more than two years and left him blind in one eye. After the war he became a planter. He was soon known throughout the state of South Carolina as a Democratic leader and as a champion of technical and industrial education. Perhaps his greatest service to the South is his founding of two technical schools, one for boys, the other for girls, the largest of their kind in the Southern states. In 1890 and 1892 he was elected governor of the state, and in 1895, 1901, 1907 and 1913 to the United States Senate. He became known throughout the country as a fiery speaker and enthusiastic fighter; his attacks on Grover Cleveland in 1895-1896 won him the nickname "Pitchfork Ben."

**TILLY,** *til'i,* Johann Tzerclaes, Count of (1559-1632), a German general who in the Thirty Years' War held command of the forces of the Catholic League, was born at the Chateau of Tilly, Brabant, in February, 1559. Destined for the priesthood, he was educated by the Jesuits, but a military life being more to his liking, he joined the Spanish army in 1574, soon rising to the command of a company. Later, this company being disbanded, he served as a pikeman in the Siege at Antwerp. He next joined the Austrian army in their war against the Turks, and in 1602, as colonel of the Imperial army, raised a regiment of Walloon infantry and led an assault on Budapest.

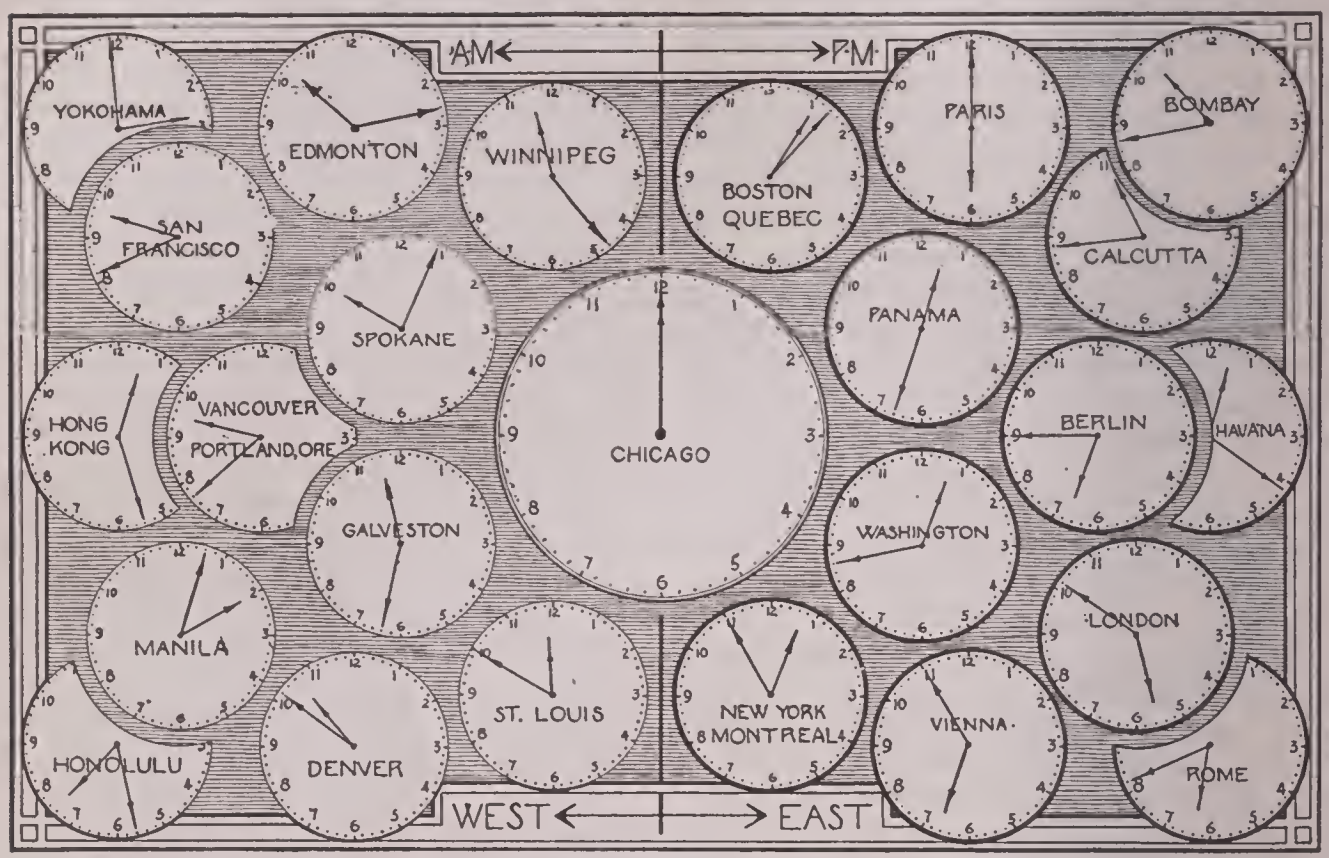
In 1604, Tilly became general of artillery, in 1605 field-marshal, and in 1610 was selected by the Duke of Bavaria to reorganize the forces of the Catholic League, which he later commanded in the Thirty Years' War. As lieutenant-general and commander-in-chief of the field forces he won a notable victory at White Hill (near Prague); was defeated by Mansfeld at Wiesloch (1622), but was victorious at Wimpfen (1622), Höchst (1622), and at Stadtlohn (1623), when he received the title of Count of the Empire from the emperor. On August 27, 1626, in conjunction with Wallenstein, he defeated Christian IV of Denmark at Lutter, a marked triumph for the Catholic League.

Subsequent to Wallenstein's dismissal in 1630, Tilly was placed in command of the Imperial forces, and after a fierce battle took Magdeburg, May 20, 1631. Tilly is often blamed for the atrocities perpetrated by the Walloons and Croatians of his army in this battle; but he saved the cathedral and other buildings from pillage and fire, and his record is otherwise that of a man of unusual integrity, considering the times in which he lived.

Four months later, on September 17, Tilly suffered defeat at the hands of Gustavus Adolphus at Breitenfeld; he met the same general in a second battle at the River Lech in a desperate conflict and received a mortal wound, from which he died three days later, April 30, 1632. See Thirty Years' War.

**TIMBUKTU,** a town of French West Africa in the Military Territory of the Niger, situated near the southern boundary of the Sahara Desert, nine miles north of Kabara, its port on the Niger River. The terrace on which it lies is surrounded by dreary stretches of sand and marshy hollows, and the place is sometimes called "the meeting point of the camel and the canoe." Timbuktu is the trading center for merchandise brought from the north of Africa and the regions south and west of the Niger, and vast quantities of goods are exchanged here every year. The items of exchange include gums, rubber, gold, salt, wax, ivory, hardware, cheap fabrics and beads. The local industries—cotton weaving and the production of pottery, leather articles and embroidery—are relatively unimportant.

When the French took possession of the town in 1894 it was almost wholly in ruins, but under a new régime it acquired schools, European churches, modern streets, fortifications and other innovations. It is an important Mohammedan center of learning and contains several mosques and a Moslem library. The people, however, live in dreary clay huts. There is through transportation service between Timbuktu by way of ocean steamer lines, the Senegal-Niger Railway (Kayes to Koulikoro) and small steamboat lines from Koulikoro to Tim-




DIFFERENCES IN TIME AROUND THE WORLD

When it is noon in Chicago it is earlier or later west and east, as shown on the dials.

buktu. Population, about 5,100. See map, facing page 81.

**TIME.** The scientist says that what we call *time* is the duration measured for all things, with a beginning and an end between an eternity past and an eternity future. A man with only the layman's viewpoint defined time in this way: "Dost thou love life? Then do not squander time, for that is the stuff life is made of." A French philosopher declares that time does not exist at all; that the past is gone and is nothing; that the future is something which may never be, and that all we have of duration is the present indivisible instant, which is gone before we can say, "It is here."

The most common idea of time is a division of duration counting from one event to another, as from the death of Charlemagne to the discovery of America, or from the visit of Aunt Susan to the week of the wheat harvest, or from the breakfast hour to the ringing of the school bell. Such duration we have learned to divide into periods of certain length, which we call years, months, days, hours, minutes and seconds.

The story of this careful development of the means of reckoning duration, or time, leads back thousands of years. Some early people reckoned it by the sun, others by the moon. The American Indians kept an account of long periods by "winters," of months by "moons" and of days by "sleeps." They took no account of weeks. When computed by the sun a day was from sunrise to sunset; this was divided into hours, but as the days were of unequal length the hour varied in the different seasons from forty-five minutes to seventy-five minutes. At length the hourglass made it more convenient to divide the time from sunrise to sunrise into twenty-four equal parts. There was no agreement as to when the day began, however. Some peoples counted the day from sunrise, some from sunset, others from midnight and still others from noon. By general custom we now declare the day to be from midnight to midnight.

It is always noon when the sun is directly overhead. Actually, then, when it is noon at

Centerville it is not yet noon at Bordertown, ten miles west, and it is past noon a few miles east. To have a different time for every few miles would prove embarrassing; therefore men devised a plan by which all people in a certain east-and-west district should accept as their true time the time of a city on a certain degree of longitude. Some sections accordingly set their clocks by Washington time, some by Detroit time, others by Chicago, or Denver, or San Francisco time.

In Europe all the western part of the continent adopted the time at the observatory of Greenwich, England; the central part very generally adopted the sun time of Berlin, and Russia that of Petrograd. This plan worked very well for many years, but it was found eventually in America that there were too many standards. In one depot in Cleveland or Toronto, for instance, the clock of one railroad might register noon, while the clocks of others using the same station might have different standards and declare the hour to be 12:30 or 11:45. To unify time for the traveling public the great modern convenience called *standard time* was adopted for the United States and Canada; it is described in an article under that title.

There is one meridian from which all world time calculations are reckoned, and this basal line is the meridian which passes through Greenwich, England. When it is noon there it is midnight exactly 180° east or west; for every 15° east or west of Greenwich the time is one hour later or earlier. This is further explained in the article LONGITUDE AND TIME. E.D.F.

Consult Boodin's *Time and Reality;* Nichols' *Psychology of Time.*

**Related Subjects.** In connection with this discussion of time the reader may refer to the following topics in these volumes. The articles on the various months and the days of the week may also be consulted.

| | |
|---|---|
| Calendar | Longitude and Time |
| Christian Era | Minute |
| Chronology | Month |
| Chronometer | Nones |
| Clock | Olympiad |
| Day | Seasons |
| Epoch | Sidereal Time |
| Hegira | Standard Time |
| Hourglass | Sundial |
| Ides | Watch |
| International Date Line | Week |
| Leap Year | Year |

**TIME,** STANDARD. See STANDARD TIME.

**TIMOTHY,** *tim'o thi,* a coworker with the Apostle Paul, born probably in Lystra, in Asia Minor, of a Greek father and a Jewish mother, Eunice (*II Timothy* I, 5), who instructed him from a child in the Old Testament Scriptures. Doubtless converted to Christianity on the first missionary journey of Paul, Timothy joined him on his second journey and continued to the end of the Apostle's life his trusted associate and friend, succeeding him as overseer of the Church at Ephesus. He is believed to have been martyred, near the end of the first century.

The *First* and *Second Epistles to Timothy,* with the *Epistle to Titus,* are known as *Pastoral Epistles.* They contain rules for church government, the qualifications of church officers, warnings against false teaching and counsel to faithful work and the endurance of persecution. There is a sharp discussion among critics as to whether these epistles are the work of Paul himself or of some later writer.

**TIMOTHY,** or **CAT'S-TAIL,** a widely-cultivated grain, one of the most valuable of all fodder grasses. The name *timothy* was applied in honor of Timothy Hanson, who introduced it among the colonists of the Carolinas in 1720. In England it is called *cat's-tail,* and in New England and New York, *herd's grass.* This grain is probably the most common meadow grass, and it is greatly relished by stock. It reaches a height of one to three feet, the slender stems bearing cylindrical spikes of minute, tightly-packed florets. Although timothy and clover are frequently planted together they do not ripen at the same time.

In Canada, particularly in Ontario, great crops of timothy are raised. The yearly production in the United States is about 18,000,000 tons, the average yield per acre being 1.22 tons, valued at $10.46 each, and making a total approximate value of $188,000,000. Of timothy and clover mixed, the annual production is about 35,000,000 tons, averaging 1.27 tons per acre, the yearly value of the mixed crops amounting to more than $357,000,000. See CLOVER; HAY.

**TIM'ROD,** HENRY (1829-1867), one of the best lyric poets of the Southern states, born in Charleston, S. C. After studying at the University of Georgia and in a law office, he accepted a position as tutor in the family of a cotton planter, finding leisure in that position to develop his taste for literature. During the War of Secession he acted as correspondent of the Charleston *Mercury* and was also assistant editor of the *South Carolinian,* published in Columbia. An attack upon this town by Federal troops broke up his home and reduced him

to poverty, and after a disheartening struggle with illness he died.

Timrod's merits as a poet were not fully appreciated until after his death, largely because his poems were published at an unpropitious time. Interest in his work revived with the publication of an edition of his poetry in 1873, accompanying which was a sketch of the author by Paul H. Hayne. A revised memorial edition also appeared in 1899. *Katie, Spring, The Cotton Ball* and *Charleston* are well-known examples of his lyrics, and he has also written an admirable ode on the Confederate dead who lie buried in Magnolia Cemetery, at Charleston. The opening lines of this poem illustrate his style at its best:

Sleep sweetly in your humble graves,
Sleep, martyrs of a fallen cause;
Though yet no marble column craves
The pilgrim here to pause.

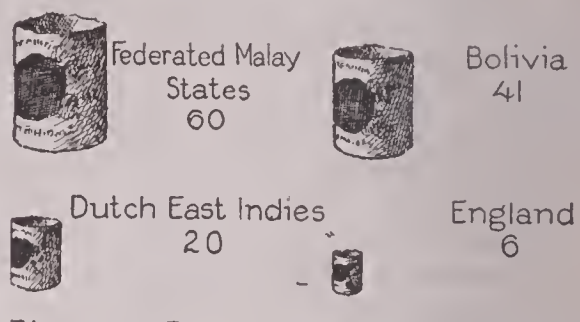
In seeds of laurel in the earth
The blossom of your fame is blown,
And somewhere, waiting for its birth,
The shaft is in the stone!

**TIMUR,** *ti moor',* more generally known as TAMERLANE (1336-1405), an Oriental conqueror, was born at Kesh, near Samarkand. From his father, Teragai, a man of retiring and studious disposition, he gained a love for reading and a reputation for a knowledge of the Koran. Soon after his twenty-first year he appeared as a leader of armies, and when Turkestan was subjugated by the Kalmucks under Tughlak Timur, Tamerlane was made governor of Kesh by Tughlak. For some years he reigned jointly over the country with his brother-in-law, Hussain. He defeated the latter in battle in 1369, whereupon he became the sole sovereign, with his throne established at Samarkand. For thirty years he subjected foes within his own territory and carried on conquests among the Mongols as far as the Volga and the Ural rivers, and among the Persians, including principally the possessions of Bagdad and Kurdistan. Wherever he went there followed death and desolation.

In 1398 the project of entering India was set on foot, and years of bloodshed and devastation followed as a part of India's gloomy history during this period. Tamerlane's capture of the city of Delhi included the possession of an immense amount of spoils and the murder in cold blood of over 100,000 men. Naturally the conqueror's triumphal return to Samarkand was attended with great pomp. Following this came a successful attack on the Turks and the Egyptians, including the capture of Damascus and Aleppo. The restless old warrior finally undertook an invasion of China, but he died of fever and ague in his encampment along the Sihun, and his body, resting in a coffin of ebony, was returned for burial to Samarkand.

In literature he has become known through Marlowe's drama *Tamburlaine the Great.* It is generally granted that Timur possessed the able insight of a statesman and administrator, and that he showed kindness and sympathy in peace. He was a patron of science, letters and art.

**TIN,** a useful metal which is nearly as white and lustrous as silver. It is called one of the inferior metals, for no other excepting lead is less ductile (see DUCTILITY), and therefore its uses are limited. Tin is among the lighter




THE WORLD'S SOURCES OF TIN
The figures represent the output of a year, averaged for five years.

metals, for it is but 7.3 times heavier than water, and it possesses another advantage in that it is not affected by the atmosphere or ordinary heat conditions, except that after exposure to the weather it loses its luster. It is therefore used more than any other material for kitchen utensils, such as pans, cups, plates and the like. When so used it is in the form of *tin plate,* which is very thin sheet iron or sheet steel coated, or plated, with tin. The reason for this combination is than tin alone is easily bent; the iron or steel sheets provide strength, and the tin adds color and luster and prevents rust in the other metal. Tin is important as an alloy in bronze; before pewter and Britannia metal fell into disuse it was used in them, also.

**Where Found.** In but few sections of the world is tin found in quantities which repay mining. It is plentiful in the southwestern tip of the British Isles (Cornwall), although for many years the mines of Wales yielded a greater amount; the latter is yet a producing field. The East Indies furnish the largest quantity; in continental Europe there are prof-

itable mines in Spain, Portugal, Russia and the German Empire, especially in Saxony. Important mines exist in Bolivia. Alaska is known to possess the metal, and there are deposits in North Carolina, South Dakota, Texas and California which yet await exploitation.

**How Prepared for Use.** The metal after leaving the mines undergoes five important processes before it is a commercial product. The ore contains arsenic and sulphur, and this is burned out in a furnace or in a roasting machine. If copper sulphide is present, as is often the case, it is converted into copper sulphate by this first process, and is drawn off by leaching. Next, the ore is smelted in a reverberatory furnace; it is heated for about six hours, after which the slag is removed, and then it is heated again for a similar period. The tin, in heated, liquid form, sinks to the bottom of the container and is drawn off and run into molds to cool.

It must be purified to a yet greater extent, so the ingots, as the cooled bars are called, are again placed in the reverberatory furnace and heated; the pure tin melts at reasonably low temperature (455° F.) and runs into a container, leaving the final impurities behind. It is then stirred until all gases escape, after which it is cooled. In the process of cooling, the purest tin, being lightest, rises to the top of the mass, the more inferior quality being in the center, while the lower layer is so impure that it must again be put through the purifying process. The pure tin ingots are sent to the rolling mill to be pressed into sheets. E.D.F.

Consult Fawns's *Tin Deposits of the World;* Louis's *Metallurgy of Tin.*

**TINTORETTO,** *teen toh ret'toh* (1518-1594), a celebrated master of the Venetian Renaissance, one of the world's greatest painters. His real name was Jacopo Robusti; Tintoretto (meaning *little dyer*) was applied because of the fact that his father was a dyer by trade. The elder Robusti, impressed by his son's attempts to decorate the walls of his shop, took him to Titian, then in the height of his fame, and requested that the latter become the boy's instructor. For some reason Tintoretto did not remain long in Titian's studio, and the two never were close friends. At the same time, the younger artist appreciated the master's genius.

By the time he had reached the age of twenty-eight Tintoretto was painting some of his greatest religious works. Among these was a *Last Judgment,* made for the Church of the Madonna dell' Orto. In 1548 he began work on four pictures for the guild house of San Marco, a group which includes the celebrated *Miracle of Saint Mark.* This picture, which the French critic Taine called Italy's greatest painting, is now one of the treasures of the Venetian Academy. It is especially admired for its dramatic action, a quality which Tintoretto was highly successful in expressing. In 1560 he began a new labor—the decoration of the Ducal Palace in Venice—and about the same time commenced work on the adornment of the walls and ceiling of the guild house of San Rocco. For this edifice he painted one of his masterpieces, a magnificent *Crucifixion.* This painting, which contains over eighty individual figures and is forty-four feet long, portrays with wonderful realism a group of women, horsemen and soldiers gathered about the Cross. The two ceiling panels of the hall he adorned with the *Paschal Feast* and *Moses Striking the Rock.*

In 1577 the guild commissioned him to paint for the hall and adjoining church three pictures a year, and the two structures to-day constitute a museum of his works, for he faithfully performed this task until his death. The culmination of his activity, however, was the completion of a colossal *Paradise* covering an entire wall of the Hall of the Grand Council. This wonderful canvas, the largest oil painting in the world, is seventy-four feet long and thirty feet wide, and contains over four hundred life-size figures. Unfortunately its original splendor has been dimmed by neglect and unskilful attempts to retouch it. The *Paradise* was his last important achievement.

In the art of Tintoretto we see the combination of a number of tendencies of the Renaissance. He was probably the equal of Titian as a portraitist, and in some respects the latter's equal as a colorist. His imaginative powers were remarkable, and in his ability to express dramatic action he ranks second only to Michelangelo. Hundreds of his works are preserved in the galleries of Europe, and America also possesses a few examples. Among these are the *Doge in Prayer before the Redeemer* and *Miracle of the Loaves and Fishes,* in the Metropolitan Museum, New York, and a *Senator,* in the Gardner Collection, Boston. R.D.M.

Consult Vasari's *Lives of the Most Eminent Painters, Sculptors and Architects,* translation by Blashfield and Hopkins.

**TIPPECANOE,** *tip e ka noo',* Battle of, a conflict between a force of 800 American militiamen commanded by William Henry Harrison, and about 6,000 Indians under the com-

mand of chiefs White Loon, Stone Eater, Winnemac and the Prophet. It was fought November 7, 1811, in Tippecanoe County, Indiana, on the Tippecanoe River. The battle brought General Harrison into such prominence that he was made commander of the American troops in the West, and the nickname "Tippecanoe," which he won at the time, was used effectively in the campaign which gained for him the Presidency (see his biography, page 2702). Tecumseh and his brother, the Prophet, had roused the Indians of the Northwest, and General Harrison decided to subdue them by force or secure a treaty from them. He arranged to meet the Prophet at the Indian headquarters on the Tippecanoe River, but before the conference could be held the Indians attacked the American camp. The Indians were driven from the field after a battle which lasted two hours, and the militia completely destroyed the Indian village. This battle was followed by a general uprising among the Indians of the Northwest in connection with the War of 1812. See TECUMSEH.

**TISSOT,** *te so'*, JAMES JOSEPH JACQUES (1836-1902), a French artist whose fame rests chiefly on a series of water-color paintings depicting the life of Christ. The collection, which consists of 350 studies, is now the possession of the Brooklyn Institute Museum. To obtain material for this labor Tissot spent ten years in the Holy Land, and he painted with painstaking attention to detail and extraordinary realism. At the time of his death he was working on a similar series illustrating Old Testament stories. It is a curious fact that during the first part of Tissot's career he depicted the worldly and sensual aspects of life in Paris, and it is supposed that his decision to paint religious scenes was the result of a spiritual change within him. These earlier pictures are represented by the series *La Femme á Paris* ("The Parisian Woman"). A well-known *Faust and Marguerite* is the property of the Luxembourg Gallery.

**TISSUE,** *tish'u,* in physiology an organization of cells grouped together for the purpose of doing a special work. There are six important kinds of tissues—muscular, epithelial, nervous, connective, osseous and adipose. *Muscular* tissue is made up of ribbonlike cells that have control of bodily movements. *Epithelial* tissue is that which covers the exterior of the body and lines the cavities connecting with the surface. The nerves are composed of *nervous* tissue. *Connective* tissue surrounds the cells and holds each in place. *Elastic* tissue is a special kind of connective tissue. The strong, rigid tissue forming the bones is called *osseous* tissue. The joints at the ends of bones are surrounded by *cartilaginous* tissue. *Adipose* tissue forms the fatty portions of the body.

**Related Subjects.** For a detailed discussion of these various tissues consult in these volumes the following articles:

| | |
|---|---|
| Bone | Membranes |
| Cartilage | Muscle |
| Cell | Nervous System |
| Joints | Skin |
| Ligament | Tendons |

**TITANIC,** *ti tan'ik,* THE, a steamship of the White Star Line which collided with an iceberg on its first trip from Liverpool to New York and sank within a little over two hours. The disaster occurred on April 14, 1912, when the steamer was about 1,600 miles northeast of New York. By means of lifeboats and rafts 706 persons were saved, to be rescued later by the *Carpathia,* which had received the wireless calls for help, but all the rest of the 2,223 souls on board, including 832 passengers and 685 of the crew, perished. At the time it was launched the *Titanic* was the largest ship afloat, but others of greater dimensions have since been built. Its length was 852.5 feet; beam, 92.5 feet; depth, 73 feet, 3 inches; gross tonnage, 46,328. Its speed was twenty-one knots (about twenty-four miles) per hour.

**TITANIUM,** *ti ta'ni um,* a metallic element which imparts toughness and hardness to steel and luster to silver, and increases the brightness of the flame of an arc lamp when combined with the carbon. It is therefore used in the manufacture of filaments for such lamps. Titanium was discovered in 1789. It is not found native, but when prepared artificially is a greenish-gray powder with a bright, metallic luster. It possesses to a remarkable degree the power of combining with nitrogen at a high temperature. Metals in which it occurs are said to be *titaniferous.* Though nowhere found abundantly it is widely distributed, and occurs in many iron ores. It is also one of the elements known to be in the sun. In the United States it is obtained in commercial quantities from rutile (which see).

**TITANS,** *ti'tanz,* in Greek mythology, the giant sons and daughters of Uranus (Heaven) and Terra, or Gaea (Earth). Six of them were men, and six were women. The latter were called the Titanides. So strong were the Titans that Uranus greatly feared them and threw them from Olympus down into a dark cavern

in the earth called Tartarus, where he chained them fast. Terra grieved over the loss of her children, and urged her husband to set them free; but whenever he heard their angry roars he renewed his determination to keep them where they were.

Finally Terra grew very angry, and herself descended into Tartarus, where she urged the Titans to revenge themselves upon their father, but all refused to undertake the heavy task excepting Saturn, the youngest. Terra gave him a scythe, released him from his chains, and bade him set forth against his father. Meeting the latter unawares, Saturn defeated him by means of the wonderful scythe, and wounded him severely. So angry was Uranus that he cursed his son and prophesied that some day he too would be overthrown by his own child. Saturn released his brothers and sisters, all of whom consented to his ruling. He selected Rhea for his wife, and assigned to each of the others some portion of the earth. Later Jupiter overthrew Saturn, and those Titans who did not submit willingly to his rule were again confined in Tartarus.

**TITHES,** from the Anglo-Saxon *teotha,* meaning a *tenth part,* usually refers to a tax of one-tenth of the profit derived from the use of land. Moses established the custom of tithes in levying upon the Jews a tax of one-tenth of their possessions or profits to support the priests. The Roman Catholic Church in the sixth century arranged for payment of tithes for the support of the Church, and later several European countries established the custom to help pay expenses of royalty.

In England in 786 tithes were exacted for all lands except those belonging to the Church and Crown, payable in services or profit in kind. These tithes are now paid in money for the support of the parish in which the land is held.

By an old law, in Quebec the Roman Catholic Church is supported by tithes. In the United States no tax of this kind is levied except by the Mormon Church, in which the law is based upon the old Jewish custom.

**TITIAN,** *tish'an* (1477-1576), universally celebrated as one of the world's masters of color, was the most eminent artist of the Venetian school of painting during the Renaissance. His real name was Tiziano Vicellio; *Titian* is a variation of *Tiziano.*

Critics do not hesitate to give him a place among the foremost painters of all time. Of him it has been said, "He is a painter who by wondrous magic of genius and of art satisfies the eye." It was not his purpose to express through his canvases intellectual ideas, but he aimed to make his works splendid in their pictorial effect, and in this respect he was supremely successful. Titian began his art studies in Venice in his boyhood, and for a long time he was dominated by one of his teachers — Giorgione (which see). He began to work along independent lines about the year 1513. During this second, or formative, period, which lasted until 1530, he produced several great altarpieces, including the celebrated *Assumption of the Virgin,* which is now in the Venetian Academy (for description see Assumption). Among other well-known canvases of this period are the *Pesaro Madonna,* in the church of the Frari, Venice; *Holy Family,* in the Louvre; *Bacchus and Ariadne,* National Gallery, London, and a *Flora,* in the Uffizi.

TITIAN
The original of this drawing was the celebrated portrait by himself.

By 1530 Titian's fame was firmly established and he had attained a sure grasp of his art. Life for him was thereafter a succession of triumphs, and princes, dukes, cardinals, kings, Pope Paul III and even the great Emperor Charles V were among his patrons. In 1532 the emperor commissioned him to paint his portrait, and so pleased was he with the completed canvas that he made the artist court painter and named him Knight of the Golden Spur and Count Palatine. There are several Titian portraits of Charles V in existence, notably an equestrian portrait of the emperor in full armor (Madrid). The artist also executed a number of portraits of the emperor's son, Philip II of Spain, and he portrayed Pope Paul III, the Duke of Saxony, the Duke of Urbino and his wife, and other persons of high position. The picture of the wife of the Duke of Urbino, Eleanora Gonzaga, now in the Uffizi, is one of the most celebrated of the female Titian portraits. Probably his own daughter, Lavinia, was his favorite subject.

Religious and mythological paintings, too numerous to treat comprehensively, were also produced in this fruitful period of a long career.

Representative of these are *Christ at Emmaus,* in the Louvre; *Madonna with Saint John and Catharine,* in the National Gallery; *Venus and Cupid,* in the Borghese Gallery, Rome; and *Rape of Europa,* in the Gardner Collection, Boston. Something, too, should be said of Titian's treatment of landscape. Though he used scenery merely as a background, or as a setting for his figures, he pictured landscape scenes with great charm, and his work in this field has a definite place in the history of landscape painting.

Titian was born in Cadore, in the Alps region, and these mountains and the Venetian lagoons appear again and again in his canvases. He died of the plague in the hundredth year of his life, and was buried in Venice in the church of the Frari. R.D.M.

Consult Ricketts' *Titian;* Gronau's *Titian and His School.*

**TITICACA,** *tit e kah' kah,* LAKE, a picturesque lake in South America, the largest on the continent, forming part of the boundary between Peru and Bolivia. It is situated in the center of a lofty valley surrounded by mountains, and its surface, which is dotted with islands, is about 12,500 feet above sea level. The lake is about 130 miles long, thirty miles wide, and about 5,000 square miles in area, two-thirds the area of Lake Ontario. In some parts it is 700 feet deep, but there are many shallow places, and numerous reed marshes occur along its shores. It is fed by numerous streams, and discharges through the Desaguadero River at its southern extremity into Lake Aullagas. A small fleet of steamers navigates Lake Titicaca between the ports of Puna in Peru and Guaqui in Bolivia, supplementing railway connections between the two countries.

**TIT'LARK.** See PIPIT.

**TITLE,** *ti' t'l,* from the Latin *titulus,* meaning an *inscription, sign,* or *token,* is a term used with many meanings. As an inscription it is prefixed to a book to designate the name of the book or to give some idea of its contents. The term was easily extended to the descriptive heading of written or printed documents, such as deeds and bills introduced in Congress or Parliament. The various documents, including deeds, which form the evidence of ownership of property soon became *title deeds,* and from this term came the common use of the word title as the "union of all the elements which constitute ownership."

**Title as Ownership.** The elements which constitute ownership are two—possession and the right of possession. The familiar saying that "possession is nine points of the law" is merely the popular expression of the rule in law that possession is *prima facie* evidence of ownership. But possession is not sufficient if the title is disputed; the right of possession must be proved. In the case of personal property possession is better evidence of ownership than in the case of real estate, for the title to the latter is usually recorded either by deed or by some method resembling the Torrens system. An exception to the rule that possession is evidence of ownership is the case of ships, title in which can be ascertained from the register.

Title to personal property may be acquired in several ways. *Original acquisition* is the technical term applied when an inventor, author or musician holds the ownership in something he has created (see COPYRIGHT; PATENT; TRADE-MARK), or when a man takes for his own use something which belongs to no one else, such as wild beasts. Title may also be acquired by gift, contract or sale, these transfers all being known as *transfers by act of the parties.* A third method is by act of law, for example in bankruptcy, judgment, intestacy or marriage.

Ownership of land may be acquired either by *descent* or by *purchase.* These are purely legal terms and are not used in their popular sense, the second class including "every mode of acquisition of an estate except that by which an heir, on the death of his ancestor, becomes owner by operation of law." Acquisition by descent, therefore, is restricted to a transfer following the death of an owner intestate.

**Titles of Honor.** Phrases or words applied to individuals as a mark of praise or distinction are known as titles of honor. In its widest sense the expression refers to all titles, whether official or honorary, military, naval, civil or ecclesiastical. A narrower definition would exclude those titles which are used as a mark of the bearer's office or profession, and include only those which indicate preëminence. Thus, *doctor* or *professor* would not be considered a title if the bearer were a physician or a teacher, but if he had been given an honorary degree from a university it would be an honorary title. This narrower sense is covered in this article; for titles in the wider sense, see ADDRESS, FORMS OF.

The Constitution forbids any officer or employee of the United States to accept a title from any foreign power, and any foreigner who holds a title must renounce it if he becomes a naturalized citizen. In Europe, however, titles

right of possession. The familiar saying that the five orders of nobility, distinguished by the titles duke, marquis, earl, viscount and baron; the title of baronet, which is accompanied by the right to use the prefix *Sir,* and knighthood, with the same right, are also purely honorary. The common forms of address, *mister* (master) in English, *monsieur* (literally "my lord") in French, and *herr,* in German, were once honorary titles, and did not become common to all men until after the French Revolution.

Honorary titles, so far as they are still used in Europe, are survivals of feudalism. They were originally applied to an individual as a mark of honor, but as the fiefs of feudal days became hereditary, the titles, too, descended from generation to generation. Titles were used by the ancient Greeks and the Romans, and especially by the Romans of the Byzantine Empire. "Most high," "most mighty," "most sacred," "all-highest majesty" are common titles. The title *caesar,* from which *czar* and *kaiser* are derived, was originally a nickname meaning "long-haired" or "hairy;" from the fact that it was the surname of the great Roman empire builder it came to have a new meaning, and in later days all Roman emperors bore the dignified title of *caesar.* The first German emperor is called *Charlemagne,* or "Karl the Great," but *karl* originally meant merely *man* or *fellow,* and survives to-day in the English *churl* and the German *kerl.* Yet the Slavs, who knew the power of Charlemagne to their sorrow, have made his name the equivalent of king *(kral* or *korol).* These are perhaps extreme examples, but most titles, in fact, quickly became set phrases, without any of their original significance. Thus, dukes are no longer leaders (Latin *dux);* counts are no longer companions *(comites)* of the emperors; and constables no longer hold the highest office in the Byzantine Empire *(count of the stable),* which later was applied to the commander-in-chief of the army. W.F.Z.

**Related Subjects.** For details concerning the various titles of honor consult in these volumes the following:

| | |
|---|---|
| Address, Forms of | King |
| Baron | Marquis |
| Czar | Nobility |
| Duke | President |
| Earl | Prince |
| Emperor | Queen |
| Kaiser | Rajah |
| Khan | Rank in Army and Navy |
| Khedive | Sultan |

**TIT'MOUSE, TIT,** or **TOMTIT,** a group of small, hardy birds with long, soft plumage, found throughout almost the entire world. The titmouse eats whatever food is to be had, but is especially valuable for destroying millions of insects' eggs and larvae. The most common North American species is the *black-capped chickadee* of the Northern United States and Canada, a gray and black bird which usually keeps to the woods in summer but comes familiarly about buildings in search of food in winter, fearlessly answering to an imitation of its call "chick-a-dee-dee-dee," and even taking food from the hand if coaxed. It nests in hollow trees or stumps, the eggs being five to eight in number and white in color, marked sparingly with reddish-brown. In the Southeastern states is found the *tufted titmouse,* somewhat larger than the chickadee and having a high crest and a loud call, "peto, peto, peto, peto," which it repeats monotonously for hours at a time.

Some Old World species of titmice are the *great titmouse,* olive-green in color, with black head and breast, common throughout Europe; the *Japanese titmouse,* a similar bird of Eastern Asia; and the *blue titmice,* which include several handsome species of Europe and Africa. The *bush tits* are tiny birds that build a bulky nest, purse shaped and often a foot in length, which they enter through a circular opening at one side or near the top.

**TI'TUS** (A. D. 40-81), a Roman emperor, the eldest son of Vespasian. He came into prominence in A. D. 70, during the reign of his father, by capturing Jerusalem after a protracted siege. On his return to Rome Titus was received with imperial honors, and shortly afterwards became a colleague of the emperor. In A. D. 79, on the death of Vespasian, he became sole ruler. He was a man of kindly impulses, and he endeared himself to his subjects by his generosity to the sufferers in the eruption of Mount Vesuvius in 79, and to those who were affected by a destructive fire and a pestilence which devastated Rome the following year. The people called him "the Friend and the Delight of Mankind." Titus is renowned in history as a builder. He completed the great Colosseum begun by his

TITUS
A coin of his reign, showing his head in profile.

father (see page 1496), built a set of magnificent baths, and restored many ancient buildings then falling into ruin. He died in the third year of his reign.

**Arch of Titus,** a Roman arch of triumph built by the Emperor Domitian in the year 81,

THE ARCH OF TITUS

to commemorate the capture of Jerusalem by Titus. It stands on the Sacred Way, facing the Forum. The inner side of the arch is decorated with reliefs depicting the exploits of Titus, and showing the spoils taken from the Temple.

**TITUS,** an associate of Paul, and, so far as is known, the first Christian missionary of purely Greek birth. He was brought by the Apostle, probably from Antioch, to the council held at Jerusalem to consider how far Gentile converts should be required to conform to Jewish rites, and was excused from circumcision by the decision of that body. He was regarded by Paul with great affection and accompanied him on many of his journeys, succeeding him on his death in the oversight of the churches of Crete.

The *Epistle to Titus* is of the same authorship and general contents as the *Epistles to Timothy.* See TIMOTHY.

**TOAD,** *tohd,* a cold-blooded animal resembling the frog, living in damp and shady places in fields and gardens. As one of the greediest eaters of grubs and insects, it is a valuable ally of the farmer and the gardener. The body of the toad is thicker and more bulky than that of the frog, and its movements are slower and more clumsy. Unlike the frog, it has no teeth. Its rough, warty skin is the color of the ground on which it lives, and this similarity is a means of protection against its foes. The skin contains glands which secrete a milky fluid, disagreeable to other animals seeking it as prey. Frogs and toads belong to the tailless amphibians.

Although "ugly and venomous," the toad "wears yet a precious jewel in his head." In these words Shakespeare described the animal's glittering, golden eyes, which when open protrude prominently. They are provided with

THE TOAD'S TONGUE

Showing the movement of the tongue in catching an insect. This organ is fastened at front instead of at the back, and can be extended fully two inches in an exceedingly rapid movement. Its surface is sticky.

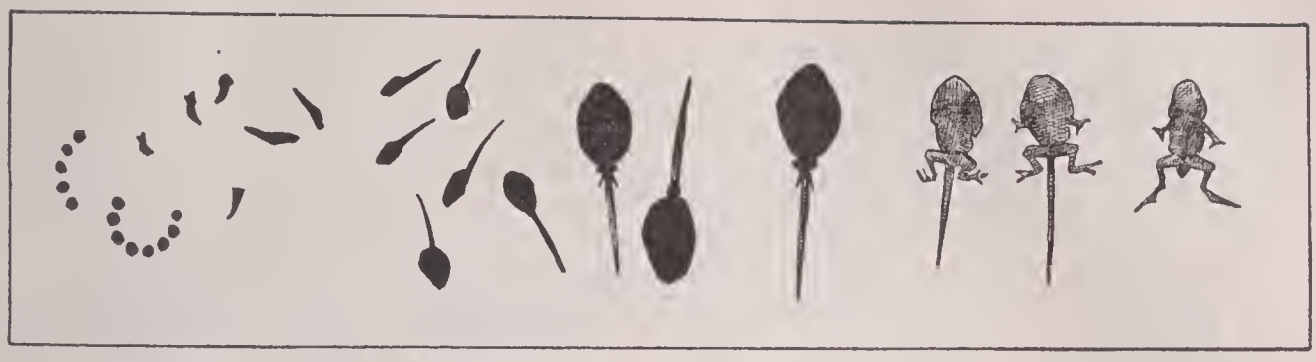
lids which rise from below like those of birds. When the toad is asleep the eyes are drawn in and lie even with the surface of the head. The toad has no ribs to aid in inflating the lungs, and is obliged to swallow the air instead. Another curious thing about this animal is the way in which it "drinks," not through its mouth, but by absorbing the water through its skin.

Toads sleep through the winter in burrows in the ground, emerging in the early spring. They migrate to the nearest pond, where they lay their eggs. These are about the size of a pinhead, and are bound together in long strands of a transparent, jellylike substance. The small, flat tadpole is hatched in from two to four weeks, and attains adult size in about two months. The development of the tadpole is shown in the illustration on next page. The

THE TOAD

outer skin of a toad is molted several times a year, and on each occasion it is swallowed.

It is not likely that toads will ever become too numerous, for they have many natural enemies. The tadpoles are the prey of newts, water beetles and fish, and the toads are eaten by snakes, hawks, crows and owls.



FROM TADPOLE TO YOUNG TOAD IN SIXTY DAYS

**Economic Value.** At night the toad leaves its hiding place under leaves or stones and ventures forth in search of food. It will eat only live grubs and insects, which it snatches up with its sticky tongue and horny, toothless

SKIN OF THE TOAD
It is shed in one piece.

jaws, and swallows whole. To employ it in a professional capacity as an exterminator of insects is a new solution for the bug problem. It is estimated that an average toad is worth five dollars a year to the farmer for the destruction of cutworms alone. It will also devour 100 rose beetles or over fifty army worms at a meal, and at the same time feed on countless others of the worst bug pests. Even in its infancy the toad is a serviceable little creature. The tadpole eats the slimes of pools and is the best scavenger of stagnant water. E.B.P.

Consult Dickerson's *The Frog Book;* Boulanger's *Reptiles and Batrachians.*

**Related Subjects.** The reader may refer to the following articles in these volumes:

| | |
|---|---|
| Amphibians | Tadpole |
| Frog | Tree Frog |

**TOADFLAX,** or **BUTTER AND EGGS,** a weed of the figwort family, with bright yellow flowers and pale gray-green leaves, growing along roadsides and in waste places throughout Central North America as far west as the Rocky Mountains. The flowers, which grow in clusters along the upper part of the stem, are tube shaped, with the edge cut into an upper and a lower lip, the former having two lobes and the latter three. A thick, orange-colored ridge on the middle lobe serves to cover the mouth of the tube, and this is forced open by the weight of a bee when it alights on it in search of nectar. Toadflax was introduced into America from Europe, and is an escape from gardens. It belongs to the same family as the snapdragon (which see).

**TOAD'STOOL.** See MUSHROOMS.

**TOBACCO,** *toh bak'o,* a plant of the nightshade family whose leaves have enormous commercial value. Tobacco is not a food, nor can it be said to fulfil any human need, but because its manufactured products are a source of pleasure to great numbers of the human race, it has an established place among plants cultivated for industrial purposes. Its harmful effects are discussed in a subhead below.

**The Plant and Its Cultivation.** There are several species of tobacco, but that designated as *Nicotiana tabacum* is commercially the most important. This plant grows from two to five feet high, and bears long, pointed leaves and terminal clusters of rose-colored or pink and white, funnel-shaped flowers. .The leaves grow directly from the stalk and vary from twelve to forty-two inches in length. Different soils and climate have more influence upon the character of tobacco and the quality of the leaf than upon any other cultivated plant. The soils affect the color and texture of the leaf and the amount of nicotine it contains. The highly fertile, light soil of the blue-grass regions produces the light-colored, mild variety known as *white burley;* the red clay soils are best for the dark, heavy types; the light, sandy soil of the "Golden Tobacco Belt" in Virginia produces the yellow variety, and the strong, dark *perique* is grown in the heavy black soil of Louisiana.

Tobacco is grown from seed sprouted in carefully prepared beds; in cold climates the plants are started in hotbeds. The seed is very small, and a handful looks very much like a quantity of finely ground black pepper. In May, that is, about five or six weeks after the sowing, the young plants are ready to be transplanted

to the field. The ground, meantime, has been thoroughly cultivated, enriched with fertilizer and laid off into furrows, or rows, three or four feet apart. In these furrows hills are made for the young plants. Long-leaf varieties demand proportionately more space than do smaller

THE TOBACCO PLANT

varieties, and the distances between hills vary from fourteen inches to three feet. If transplanting is done by machinery, from three to six acres a day can be worked. With hand labor an industrious workman can set from one to two acres in the same time.

Frequent cultivating and the elimination of weeds and of insects and their larvae are necessary. Topping of the plants to prevent flowering and to concentrate the strength in a few leaves is practiced in the production of tobacco raised for leaves and not for seeds. Topping results in the formation of false leaves, or suckers, and these must be pulled off as fast as they appear. In several states the United States Department of Agriculture has made experiments in the cultivation of tobacco under canvas covers. This method causes the plants to mature earlier and to bear finer and more delicately-flavored leaves.

**Harvesting and Curing.** Tobacco leaves are ready for harvesting when the surface becomes a mottled yellow and green. The methods of cutting and curing vary for different kinds of tobacco. In some cases the entire plant is cut down when the middle leaves are ripe, and in others the leaves are removed separately as each one matures. In harvesting white burley, which is used extensively for making plug and fine-cut chewing tobacco, the entire stalk is cut and then split a little more than half the length. The stalks are then wilted and placed astride a stick, at the rate of seven plants to a stick. After being left for a time in the open air the plants are taken to ventilated sheds, where the leaves are cured by exposure to air. Yellow-tobacco leaves are stripped from the plants as they ripen, and are cured in houses equipped with flues that convey artificial heat. Heavy tobaccos raised in America for export to Europe are cured by the heat of open log fires, as the smoke imparts a creosotic flavor that is very popular with European customers.

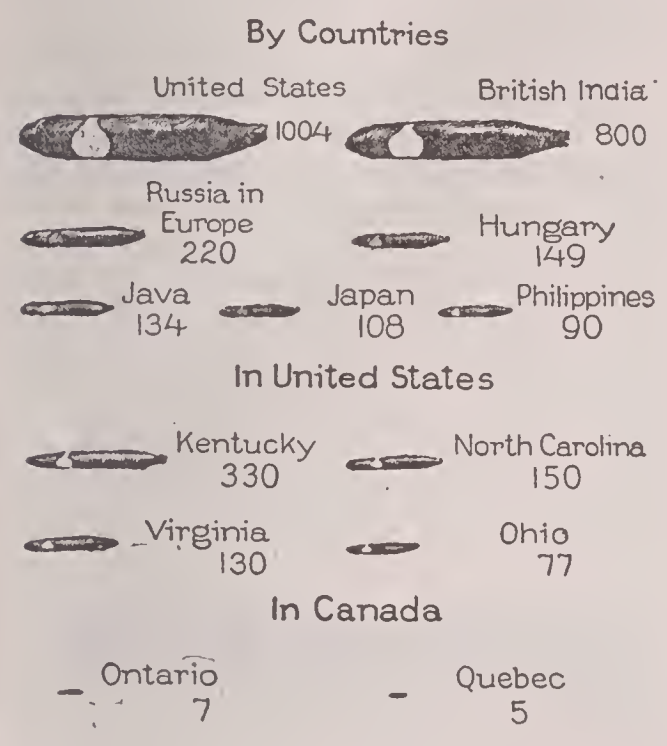
Perique, which is one of the choicest grades of smoking tobacco, and is prized because of its rich flavor, is cured by subjection of the leaves to great pressure. Seed leaf, a variety in extensive use for cigar manufacture, is air-cured like white burley, in ventilated houses. A high-grade chewing tobacco with a sweet, delicate flavor, which is grown to a limited extent in Spottsylvania County, Virginia, is cured in the sun. This method is too expensive to be

CENTERS OF PRODUCTION

The chief tobacco fields are indicated by the groups of dots on the map.

adopted generally. After tobacco is cured it is softened in moist air, packed in boxes and taken to the warehouse, where it must undergo a "sweating," or fermenting, process before it is ready for the market. This is for the purpose of reducing the proportion of nicotine and developing the aroma.

**Production.** The United States is the greatest producer, exporter and consumer of tobacco. In 1916 there were 1,411,800 acres devoted to tobacco culture in the country, and the total product was 1,150,622,000 pounds.




AN AVERAGE YEAR'S CROP

In the illustration the relative sizes of the cigars, the chief tobacco product, indicate the comparative yields in the world's tobacco districts.

The ten leading states in tobacco production are Kentucky, North Carolina, Virginia, Ohio, Tennessee, Pennsylvania, Wisconsin, South Carolina, Maryland and Indiana, ranking in the order named. Holland first cultivated tobacco in Europe, but the industry soon spread to other countries. British India, Russia, Hungary, the Dutch East Indies, Japan, the Philippines, Porto Rico, Santo Domingo, Cuba, Brazil, Germany, France and Mexico are all important tobacco countries.

**Manufacture.** The manufacture of tobacco products is an industry of enormous proportions. In the United States alone the government derives an income of about $100,000,000 a year from tobacco taxes. The chief products are cigars, cigarettes, and smoking and chewing tobacco. The first steps in the manufacturing process are the cleaning and stripping of the leaves. By *stripping* is meant the removing of the midribs and stems. Tobacco for chewing is pressed into cakes, and flavored with vanilla, licorice, sugar, etc. Pipe tobacco is finely cut and marketed in small bags or tins, or is put up in thin cakes or rolls.

Cigars are made from carefully-selected leaves, for the inner material, known as the *fillers,* must be of uniform quality. A cigar consists of core (fillers), an inner cover and an outside cover, or wrapper. The core must be so arranged that the cigar will burn evenly and the smoke be freely drawn through it. The two covers are made of tobacco leaf, and the outside piece is shaped so that it can be wound about the cigar in a spiral. After being wrapped the cigar is dried in the sun or in mild artificial heat.

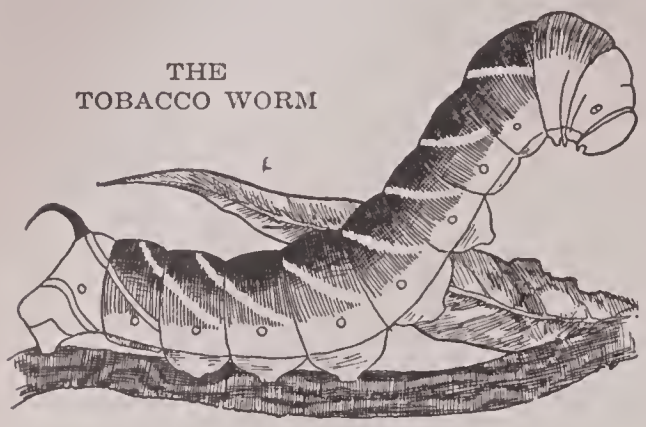
The finest cigars made are manufactured in Cuba of a native tobacco called *Vuelta Abaijo leaf.* The word *Havana* is the trade name for all cigars made from Cuban tobacco, but genuine *Havanas* are produced only in the island or in Florida, where there are a number of factories having Cuban workmen. In the manufacture of high-grade cigars much of the work is done by hand, but cheaper brands are made by machinery.

Cigarettes are small, paper-covered rolls of tobacco cut very fine. Some smokers prefer to roll their own cigarettes, but these tobacco products are made in vast quantities by machines which turn out several hundred per hour. As is true of cigars, the best cigarettes are made by hand. Cherocts are an inferior kind of cigar, with both ends open and cut square across. Manila is the most important center of their manufacture. Snuff is a tobacco product now much less important than formerly.

**Effects of the Use of Tobacco.** Ever since tobacco was first used in Europe its influence upon the health and morals has been the subject of much discussion. Like alcohol, opium, tea and coffee, it possesses narcotic properties, and it is generally agreed that its use in excess is harmful and that its habitual use by the young decreases bodily and mental vigor and development. A certain disease of the eye is common among smokers and those using strong preparations of tobacco (see BLINDNESS). After mental or physical strain its narcotic properties have a soothing and restful effect upon the nerves, and it is to this quality that it owes its wide popularity. There is no evidence that the use of tobacco deadens the moral sensibilities, as is true of opium, morphine and alcoholic drinks, and in general it may be said that there is no serious objection to its moderate use by adults. The developing youth, however, should avoid tobacco in every form.

**Tobacco Worm,** the name applied to the larvae of two species of sphinx moth, which

feed on the leaves of the tobacco plant. They are large green caterpillars having diagonal white stripes along the sides, and a sharp horn at the back of the body. These worms also feed on the leaves of the tomato plant, another



THE TOBACCO WORM

member of the nightshade family. Weeds of the nightshade group planted near tobacco fields will serve as a decoy for the pests, and heavy applications of Paris green will kill them. See INSECTICIDES AND FUNGICIDES.

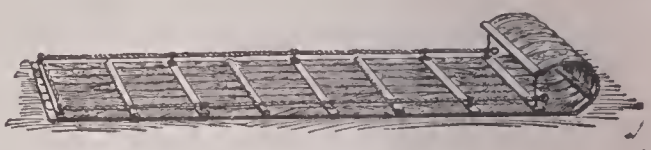
**History.** Although it is believed that tobacco was used in China in ancient times, the knowledge of the plant and its uses spread to the rest of the world through America. At the time Columbus discovered the New World, the Indians were using tobacco in tribal ceremonies and in religious rites, and this custom had prevailed for centuries. The plant was introduced into Spain from Santo Domingo in 1559, and the same year seeds were sent to France by Jean Nicot, the French ambassador to Portugal, who gave his name to the essential principle of the plant—*nicotine*. Sir Francis Drake took the plant to England in 1585, but it was through the illustrious example of Sir Walter Raleigh, who "took a pipe of tobacco a little before he went to the scaffolde," that smoking spread among the courtiers. Although smoking was strongly opposed by the Church and State, and its devotees were threatened with severe penalties, such as the lash, excommunication and even capital punishment, the popularity of tobacco spread with amazing rapidity throughout Europe and Asia. There are several explanations for the origin of the name tobacco. It has been connected with the name of the pipe smoked by the Carib Indians, with the old name of an island near Trinidad, now known as *Tobago,* and with *Tobaco,* the name of a province in Yucatan, and there are other possible sources. E.B.P.

Consult Werner's *Textbook on Tobacco;* Tanner's *Tobacco from Grower to Smoker.*

**Related Subjects.** In connection with this article on tobacco, the reader may consult the following topics in these volumes:

| | |
|---|---|
| Anti-Cigarette League of America | Narcotic |
| Cigarette | Nicotine |
| Internal Revenue | Snuff |

**TOBOGGANING,** *toh bog'an ing,* an exhilarating outdoor sport which consists of coasting on snow or ice by means of toboggans, or sleds without runners. A typical toboggan is shown in the accompanying picture. It is made of strips of hickory, ash or maple, turned up in front and fastened together by crosspieces. The surface that touches the snow or ice is highly polished, and there is a light handrail on each side. The sled is usually about a foot-and-one-half wide and from six to eight feet long. A toboggan load consists usually of four people, the one at the rear acting as steersman. In mountainous countries the snow-covered hills



A TOBOGGAN

are used for slides, but in level localities artificial ice chutes are constructed. A tremendous rate of speed is possible, 900 yards in thirty seconds having been recorded.

Toboggans were originally built by Indian hunters to carry their dead game across the snow. They were first built of a strip of bark, turned up in front to breast the snow. The Eskimos make sledges of strips of whalebone.

**TOBOLSK,** *toh bahlsk',* the capital and chief town of the Russian government of Tobolsk, is situated in the western part of Siberia on the Irtish River, at its junction with the Tobol. Since the completion of the Trans-Siberian Railway the city has declined, but is still an important center of river commerce. Fishing and the making of fur are the chief industries of the inhabitants. The place is substantially built, and has a citadel and numerous churches. Among the relics of the old régime is a workhouse for Siberian exiles. In the summer of 1917 the deposed czar and his family were sent as prisoners to Tobolsk and established in exile. Population in 1913, 24,800.

**TOCANTINS,** *toh kahn teenz',* a river of Brazil. It rises in the southern part of the state of Goyaz, and after flowing northward for about 1,700 miles, empties into the Atlantic through the Para River, the southern estuary of the Amazon. It is navigable for large steam-

ers to the Falls of Itaboca, about 470 miles above the estuary; above this point there are several reaches navigable for smaller boats, but many falls and rapids make uninterrupted travel impossible. The chief tributary is the Araguaya, which meets the Tocantins 600 miles above the Para.

**TOCQUEVILLE,** *tohk veel',* Alexis Charles Henri Clérel de (1805-1859), a French statesman and author, born at Verneuil and educated for the law. In 1830 he became an assistant magistrate at Versailles, but in the next year resigned his office and with Gustave de Beaumont set out for America on a government mission to investigate the prison system. The published report was of value, but of far greater moment was his *Democracy in America,* which gained him a wide reputation. In 1839, after a visit to England, where he was most enthusiastically received, he was elected to the Chamber of Deputies, and in that body opposed the government. After the Revolution of 1848 he was Vice-President of the Assembly, and for five months Minister of Foreign Affairs. From 1851 until his death he lived in retirement and in 1855 published *The Ancient Régime* and the *Revolution,* which achieved a tremendous success.

**TOGA,** *toh'ga,* from the Latin *tego,* meaning *I cover,* was the national garment of the Roman male citizen, numerous references to which occur in classic Latin writings. Originally it was worn by both men and women, but the latter eventually replaced it by the stola, both garments being worn over the tunic. The toga was a piece of woolen cloth, the exact shape of which is disputed by authorities. Some say that it had the form of a segment of a circle, the chord of the arc being about three times the height of the wearer, and the height of the segment not quite half the length of the chord. Others say it was elliptical in shape and was folded lengthwise before being put on. One end was thrown over the left shoulder and permitted to hang down in front, while the rest of the garment was drawn around the body and variously arranged, the style of arrangement differing at various periods of Roman history.

ROMAN TOGA

The ordinary plain white garment of the citizen was known as the *toga pura.* The *toga praetexta,* having a border of purple, was worn by curule magistrates and some priests, and also by boys until they reached the age of sixteen. The latter assumed the plain white toga (*toga virilis*) at sixteen, an important event in the life of every boy. At the celebration of a triumph generals donned a purple or crimson toga embroidered with gold (*toga picta*), which was worn over a gold-embroidered tunic *(tunica palmata);* this was also the garb of magistrates presiding at games, and was adopted by Julius Caesar as his regulation dress. A toga smaller in size than the *toga pura,* having scarlet stripes, worn by the consuls when they opened the temple of Janus, and by certain other officers, was known as the *trabea.* The *toga candida* was the clean and artificially whitened garment in which the candidate for office appeared, while persons in mourning wore a soiled and carelessly arranged toga (*toga sordida*).

The toga was so intimately associated with the activities of the ancient Roman that it became the distinctive badge of his citizenship, and its importance is to-day reflected in current speech. Thus the men who assume the duties of lawmaking, especially Senators, are said, in figurative language, to have "donned the toga." B.M.W.

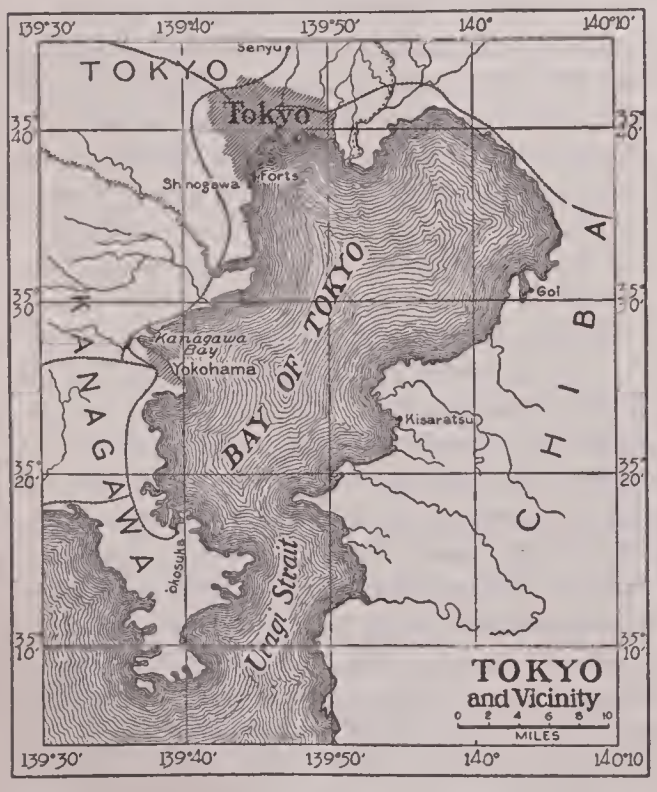
Consult Johnston's *The Private Life of the Romans.*

**TOGO,** *toh'go,* Heihachiro, Count (1847- ), a Japanese admiral and naval hero of the Russo-Japanese War. He was born in Kagoshima, of a family belonging to the military nobility. He entered the naval service at the age of sixteen, later received instruction on the British war vessel *Worcester* and at the Naval College at Greenwich, and in 1894, while commanding the *Naniwa,* fired the first shot in the Chinese-Japanese War. Promoted to rank of vice-admiral in 1900, he was made commander of the naval dockyards at Maizuru, and in that capacity did much to build up the navy which signally defeated the Russians in 1904-1905. For his part in that struggle see the article Russo-Japanese War. In 1912 Count Togo was made admiral of the Japanese fleet, which in 1916 ranked fifth among the world's navies.

**TOGOLAND,** *toh'go land,* a colony on the Gulf of Guinea, on the West Coast of Africa, annexed by Germany in 1884 and captured by British troops in 1916. The coast line of Togoland is only thirty-two miles in length, but the colony extends far inland and covers a total area of 33,000 square miles. The climate is hot and unhealthful; of the population, numbering about 2,500,000, only 200 are whites. The capital and chief port is Lome, with a population of 5,000, once an important center of the slave trade. Many small streams flow from the interior into the Gulf of Guinea. There is a short line of narrow-gauge railroad between Lome on the coast and Little Popo, an important trading post in the interior.

The principal exports are palm oil, rubber, ivory and copra. Elephants and lions are found in the interior, but the elephants have been so much hunted for ivory that they are becoming scarce. Yams, corn, bananas, ginger, tobacco and cocoa are extensively cultivated, but not yet in sufficient quantities for export. The natives are expert wood carvers, and have considerable knowledge of dyeing and weaving.

**TOKYO,** or **TOKIO,** *toh'ke o,* the capital and largest city of the Japanese Empire, is situated on the Bay of Tokyo, on the southeastern shore of the island of Hondo. It covers an




area of thirty square miles and has a population of 2,033,321, ranking sixth among the cities of the world (see CITY, page 1393). In Tokyo the traveler sees the effect of Japan's acceptance of Western ideas, for narrow, unsanitary streets have been widened to make thoroughfares for electric cars, and many new buildings of modern architecture have been erected. A magnificent system supplies the city with water obtained from Lake Inokami, fifteen miles distant, and there are plants for electric and gas illumination. Electric cars, though they have decreased the number of jinrikishas (see page 3152), have not entirely replaced those picturesque conveyances.

The city is divided into unequal east and west sections by the Sumida River, sometimes called the "Thames of Tokyo." Along the bay on both sides of the river are flat areas, constituting lowland Tokyo, while in the western outskirts rise hills from fifty to over a hundred feet in height. A network of canals occupies the lowland section, and these and the river are spanned by numerous bridges. The most conspicuous feature of the city is the imperial palace, on the site of the old castle of the shogun, which was burned in 1872. Originally the grounds were surrounded by three lines of walls and moats. Much of the outer wall has been demolished and the moat has been filled up, and in the space formerly enclosed by them have been erected several modern government buildings. The palace is a beautiful structure partly in Japanese and partly in European style of architecture, and the surrounding grounds constitute one of the loveliest parks in Tokyo. One of the royal princes has a palace characteristically American in design.

The section east of the royal palace is occupied by warehouses, banks, shops, newspaper offices and other commercial buildings. The principal business thoroughfare extends in a northeasterly direction through this part of the city, and is crossed by innumerable streets and alleys. In this section of Tokyo one sees a miscellaneous jumble of small wooden shops and houses, mud buildings and modern structures of brick and stone. The northern part of the city contains the arsenal; the Imperial University (see subhead below); Ueno, an extensive park containing the Zoölogical Gardens, the Imperial Library and the Imperial Museum; and a famous temple to the goddess of mercy, in a spacious park that is a favorite resort for the people on holidays.

The section east of the river is especially interesting to tourists, because here may be seen the flower displays of cherry blossoms, wistaria and iris for which Tokyo is famous, and the great wrestling matches, held in the temple of E-ko-in. The so-called Foreign Concession

is on the west bank of the Sumida, but for a long time there have been no restrictions as to the section in which foreigners may reside. The streets leading from the foreign quarter contain many shops where wonderful ivory carvings and other specimens of Japanese handwork are displayed.

Tokyo has well-organized fire and police systems, and is governed by a mayor, a municipal council and a municipal assembly. The city is not an important commercial or industrial center, though numerous factories have been established in the suburbs. The river is too shallow to permit navigation by large ships, and Yokohama, eighteen miles south, is the port of Tokyo. The capital is connected with all parts of the island by railways. Tokyo is the outgrowth of a small village called Yedo, and the city which developed from this hamlet was known as Yedo until 1868, when the present name was adopted. It has suffered greatly from earthquakes, fires, storms and pestilence, but has maintained its prosperity. See JAPAN.

**University of Tokyo,** a government institution under the control of the department of education of Tokyo, comprising schools of law, medicine, engineering, literature, science and agriculture. The school of agriculture is situated in a suburb six miles away from the main campus, and the botanical institute is in the botanical gardens, about a mile and a half distant. The university was established in 1868. It regularly enrolls over 5,300 students, and there are about 375 instructors, of whom 120 rank as professors. But few foreign instructors are now required, and the faculty is made up chiefly of Japanese who were educated in Europe or America. The institution is equipped with a library of over 491,000 volumes and an observatory. The students wear a square cap with a golden badge, and are held in great respect. Athletic games are a feature of the university life. Tokyo University is the best educational institution in the Far East. R.D.M.

**TOLEDO,** *toh le' doh,* OHIO, the county seat of Lucas County and the fourth city in size in the state. Only Cleveland, Cincinnati and Columbus are larger. It is situated at the mouth of the Maumee River, which empties into Maumee Bay. The latter is an inlet of Lake Erie, from which Toledo is nine miles distant. Cleveland is ninety-six miles east and Columbus is 124 miles south. Transportation facilities are provided by the Ann Arbor, the Cincinnati, Hamilton & Dayton, the Cleveland, Cincinnati, Chicago & Saint Louis, the Hocking Valley, the Michigan Central, the New York Central, the Pennsylvania Company, the Pere Marquette, the Toledo & Ohio Central, the Toledo, Saint Louis & Western, the Wabash and the Wheeling & Lake Erie railroads. Steamers ply between Toledo and the other lake ports, and a fine system of interurban lines supplements the railroad service. In 1910 the population was 168,497; this had increased to 191,554 by 1916 (Federal estimate). Germans, Irish and Scandinavians predominate in the very considerable foreign element.

**Parks and Boulevards.** Toledo has an attractive location on both sides of the river. More than 800 acres are embraced by the park system, the largest and most attractive of these reservations being Ottawa Park (280 acres), which has one of the finest golf courses in America. Bay View Park, on the river bank, Walbridge Park, with its "zoo," and Central Grove, Riverside, Collins and Navarre parks are among the other recreation grounds. All of these "breathing spots" will eventually be linked by a boulevard system which is partially completed.

**Buildings and Institutions.** Toledo has many fine buildings. These include the county courthouse, with a park containing a statue of President McKinley; the post office, erected at a cost of $500,000; the Soldiers' Memorial, the Newsboys' building, Y. M. C. A. and Y. W. C. A. buildings, a Masonic Temple, the Valentine Theater, with an unusually attractive interior, and the armory. Among the educational institutions are Toledo University, Saint John's College, for men and boys, Notre Dame and Ursuline academies, Toledo Medical College, Smead School, for girls, the Museum of Art and the public library, which is housed in a handsome building. The benevolent institutions include the state hospital for the insane, which is conducted on the cottage plan and harbors more than 1,500 people; Saint Vincent's Hospital, Saint Vincent's Orphanage, the county children's home and the Lutheran Orphan Asylum.

**Industry and Manufacture.** The Federal government has expended more than $2,000,000 in improving the port facilities at Toledo, where there are many miles of docks and warehouses. The city is an important shipping point for the grain and lumber of the north-central section of the United States, and for iron and soft coal. It has exceptional advantages in this respect because of its location at the western end of Lake Erie.

Fine shipping facilities and proximity to coal and natural gas fields have stimulated the manufacturing industry. As the city has access to the ores from the Lake Superior region and the coal from West Virginia, Ohio and Pennsylvania, large steel plants and blast furnaces have been built here. The foundry and machine shop products and plate glass and cut glass made in Toledo have a wide reputation for excellence, and it has one of the largest winter-wheat mills in the United States. Automobiles, wagons and boats—even those of the seagoing class—are extensively made here, and the grinding of coffee and spices is another important industry. In 1917 one of its automobile factories was second in quantity of output in the United States. There are several grain elevators and a large number of wholesale and jobbing houses in Toledo, and it is a foremost clover-seed market.

**History.** In 1833 the rival villages of Port Lawrence and Vistula were united and the name Toledo was chosen for the new town, in honor of the old Moorish capital of Spain. The opening of the Wabash and Erie Canal in 1843 and of the Miami and Erie Canal two years later and the construction of steam railroads to this point in 1837 were important factors in the growth of the place. In 1846 it was incorporated as a city. What is known as the Toledo War was a contest between the state of Ohio and the territory of Michigan for the possession of a district which included Toledo, in which Ohio secured the strip. W.A.P.

**TOLL,** *tohl,* a tax or duty paid for the exercise of a liberty, privilege or advantage. The word itself is derived from a Greek word for *tax,* and originally meant *something counted;* as tax collectors had to count sheep and many other things, the idea of counting became associated with taxes. At first any kind of a tax was a toll; later it was only a special tax, as defined above.

One of the commonest forms of tolls was that which confronted every traveler over turnpikes in the United States and Canada during the greater part of the nineteenth century. At regular intervals a gate was placed across the road, to be raised only after the traveler had paid toll. The charge varied, that for a man on horseback being perhaps half that for a team and wagon, and usually five or ten cents. Such tollgates are still found in many parts of Europe, but they have practically passed out of existence in North America. The proceeds of this tax were used to pay for repairs, thus making it possible to maintain fairly good roads even in sparsely-settled regions.

Another form of toll, still common in Europe, is the bridge toll. Such tolls are paid to the owners of the bridge, usually a municipality, and are seldom more than the equivalent of one or two cents per person. The fare charged by a ferryman is sometimes called a toll; so also is the fee, in cash or in grain, charged by a miller for grinding grain into flour. The charges by canal and railway companies were formerly called toll, but are now more generally spoken of as *fare.* In the United States the regulation of toll charges on highways and bridges is a subject for state legislation; charges on rivers or in harbors for docking or other privileges are under the control of Congress.

Tolls are also of international significance. Formerly the navigation of the Scheldt and of The Sound was restricted by tolls levied respectively by Holland and Denmark. Modern international law, however, no longer accepts the right of a nation to charge for the use or navigation of natural waters. Tolls are charged on a number of canals of international importance, namely the Suez, the Sault Sainte Marie, and the Panama. The charges are moderate, and are designed merely to pay the cost of maintenance and interest on the capital invested. W.F.Z.

**TOLSTOI,** *tahl stoi',* (also spelled Tolstoy), Count Lyoff Nikolayevitch (1828-1910), a Russian novelist and essayist, born at Yasnaya Polyana, September 9, 1828. His family, originally from Germany, belonged to the wealthiest class of the Russian nobility, and the boy received every advantage of education and cultured environment. He was educated at the University of Kazan, Russia, but was in constant revolt against the strict doctrinal teachings and narrow views of the institution. Kazan was a center for Russian social festivities, but the balls and fêtes disgusted him, and he withdrew more and more to himself for reading and reflection. He passed from one department to another at the university—to history, Eastern languages, religion and law—and found no satisfaction in any of them.

**Service in the Army.** In 1847 he left the school, broken in health and disturbed about his mental and moral condition. At home he found misery and rebellion among his serfs, and vainly undertook to bring happiness and prosperity again to his estates. Almost in despair, he gave himself up for a time to gambling and carousing, but his nature was too noble for such

dissipation, and in 1851 he entered the Russian army and served bravely against the Circassians on the Western borders of his country. In the midst of such conditions he began to write. His first accepted story was a simple but sincere account entitled *Childhood,* and was soon followed by *Boyhood and Youth.* These dealt with the scenes and incidents about his own home, but also showed clearly the influences of Rousseau in their belief in nature and in an education derived largely from nature.

COUNT TOLSTOI
The Russian sage in peasant garb.

He next served in the Crimean War, and while at Sebastopol wrote his famous *Tales from Sebastopol.* Weary of war and seeing absolutely no glory in bloodshed, the young man returned home. He found that his magazine stories had made a name for him among Russian authors, but his views on society, religion, war and politics were so different from those held by other writers that he could not at that time name an intimate friend in all Russia.

**Demanded Freedom for Serfs.** In 1855 the question of freedom for the serfs arose, and Tolstoi threw his whole soul into the battle for the rights of those enslaved laborers. Between 1857 and 1861 he visited Germany, France and England to see how common workmen fared in those countries, and returned home profoundly impressed with the belief that Russian social conditions were wrong. He freed his own serfs, and opened a school where the idea of compulsion was never allowed. This rich nobleman and famous author became a humble teacher himself, and for nearly two years taught singing and drawing. The institution closed because of the secret animosity of the government, and Tolstoi turned once more to his farm for consolation. In bitterness of heart against military and civil oppression he wrote two violent stories, *Three Deaths* and *The Cossacks.*

His marriage in 1862 seems to have brought more peace of mind and concentration, and soon afterwards he began his greatest novels, *War and Peace* and *Anna Karenina.* The first, one of the masterpieces of the world's literature, deals with Russia between 1805 and 1815, and is a powerful but gloomy picture of the sufferings of the common workman. During his thirty-fifth year his anxiety for the welfare of his fellow men increased. His *Death of Ivan* and *The Power of Darkness* reveal the change, for in those books his sympathy for suffering humanity is almost beyond his power of expression. Then came his rebellion against the Greek Catholic Church, as shown in *My Confession* and *My Religion.* It appeared as though he was in revolt against religion, society, and civilization itself; but it was clearly only the longing of a noble heart to right wrongs.

**Entered upon Simplicity of Life.** In 1880 Tolstoi renounced a life of ease, for ten years labored all day in the fields as an ordinary workman, ate no meat, gave up tobacco, allowed his hunting gun to rust and lived what he called the life of simplicity. One night in 1888 he announced to his family that the next day he would divide all his property among the poor and live a life of poverty; only after hours of pleading did his family persuade him to turn the entire estate over to his wife. Henceforth he never had a penny of his own. He refused money for his writing, earned his living by farming and making shoes, and associated almost entirely with the peasants. He adopted the policy of nonresistance, and declared that Christ had ordered such peaceful methods. Under those conditions he wrote such masterpieces as *The Kreutzer Sonata,* one of the most vivid pictures of sordid life in all literature, *Master and Man, What Is Religion?* and *The Resurrection.*

In 1901 he was excommunicated by the Greek Catholic Church because of his teachings, and when he died in a hut at Astapovo, where he had gone to avoid admirers, he was refused a funeral ceremony and a grave in a regular cemetery. Two questions which he ever sought to answer—*Why do I live?* and *How should I live?*—form the basis of most of his writings, and in his efforts to solve these problems he produced literature that will always have a deep influence because of its sincerity, thoughtfulness, sympathy and stern justice. M.R.T.

Consult Biruhoffs *Tolstoy, His Life and Work;* Knowlson's *Leo Tolstoy;* Turner's *Count Tolstoy as Novelist and Thinker.*

**TOM'AHAWK,** originally a war club or hatchet, used by the North American Indians. In early times tomahawks were clubs of deer horn or stone attached by cords of skin to wooden handles. When the Europeans formed alliances with the Indians they introduced a new kind of tomahawk which could be used as an implement of warfare or as a tobacco pipe. The handle formed the stem and the blunt side of the hatchet head was hollowed out to hold the tobacco. Tomahawks were employed in close conflicts or were thrown with great skill from a distance so that the sharp edge of the hatchet would strike the enemy. The phrases *burying the hatchet* and *digging up the hatchet* are Indian expressions, equivalent to *making peace* and *declaring war.*

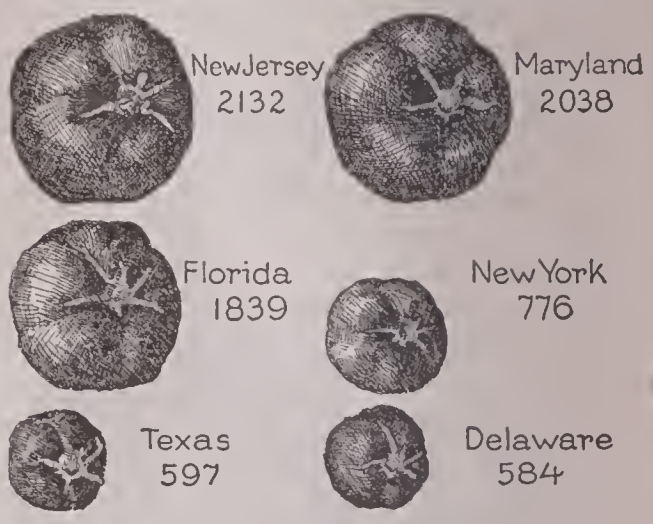
**TOMATO,** *toh ma' toh,* or *toh mah' toh,* a fruit which is always regarded as a vegetable, and is eaten either raw or cooked. It belongs to the same family as the potato, the eggplant and the tobacco plant. It is interesting to note regarding these three members of the family, that while the valuable part of the tomato plant and the eggplant is the seed pod, or fruit, the edible part of the potato plant is its roots, and the only usable part of the tobacco plant is its leaves.

The tomato was originally native to South America, probably Peru, and was first introduced into Europe and North America as a decorative garden plant, known as the *love apple.* It was not until about the year 1800 that people discovered it to be good to eat and

THE TOMATO

began using it as a food. The fruit was then much smaller, was irregular in shape and wrinkled; scientific cultivation was necessary to produce the round, red, smooth and firm tomato of to-day.

Tomatoes are very sensitive to frost, but otherwise they are easy to cultivate. The seed should be planted indoors under glass; the young plants are transplanted to the field or garden as soon as the frost is out of the ground.




THE CROP

Average value of the tomatoes grown in a year in the six leading centers of production.

If set about three and a half feet apart the plants will have room to develop without crowding, and give opportunity for clean cultivation. If the plants are tied up and trained on stakes or a trellis they will grow often to a height of six feet. If, in addition, the vines are pruned to one or two stems and the fruit is kept off the ground, the yield is increased.

The heat-producing value of tomatoes is very low, about 105 calories to the pound, as compared with 575 calories for sweet potatoes or 440 calories for plain boiled potatoes (see FOOD, subhead *Chemistry of Food*). But because they contain valuable mineral salts and acids, added to their delightful flavor, tomatoes have become increasingly popular as an article of food. In Italy many table dishes contain tomatoes. In America sauces and relishes and pickles are made from the fruit, both the green and the ripe, and large quantities are canned. In fact, so popular have factory-canned tomatoes become that the home-canning industry has greatly decreased. The output of canned tomatoes is larger in the United States than that of any other fruit. New Jersey ranks first in the production, then come Maryland, Florida, New York and Texas, in the order named.

**Tomato Canning.** In these volumes, on page 2249, directions for canning tomatoes are given. Other information related to the growing of this vegetable will be found in the following articles:

Boys' and Girls' Clubs
Canning Clubs
Food Products, Preservation of
Gardening

**TOMB,** *toom,* any chamber wherein the dead are buried, whether hollowed out of the rock or built above ground. Often a tomb is a combination of these two types. Like most burial customs, the use of tombs among the ancients was originally an outgrowth of a belief in the immortality of the soul. The Egyptians, for instance, believed that a man's *ka,* or double, haunted his burial place, waiting its time to reinhabit the body, and they consequently carved or painted on the walls of their tombs objects in which the deceased had been interested. Tombs were very common among the Egyptians, as indeed they were among almost all Oriental people. The Pyramids are the most impressive examples of their peculiar form of sepulchral architecture, but no less interesting are the tombs hewn in the rocks, with their numerous chambers and labyrinthine passages. The Jews made use of such rock burial places; Christ was placed in a new rock sepulchre belonging to Joseph of Arimathea.

The Greeks, too, made use of both types of tombs, the older form being the rock hewn. Their raised tombs were for the most part very simple affairs, although in the colonies in Asia Minor very elaborate structures existed. The most famous of these, accounted one of the Seven Wonders of the World, was the tomb of Mausolus, in Caria, from which the word *mausoleum* is derived. The Romans gave far more attention than did the Greeks to the erection of memorials to the dead, and along the Appian Way were numerous tombs, most noted of which was the tomb of Hadrian. Other Roman cities, too, had streets lined with tombs, as has been shown by the excavations at Pompeii. A special type developed in some parts of Italy consisted of numerous niches hewn into the rock, wherein were placed all the dead of a family, or even of a small community. The Mohammedans made much of sepulchral architecture, taking as their favorite form the circular, domed tomb which they modified and elaborated until it resulted in such exquisite structures as the Taj Mahal, perhaps the most beautiful building ever erected.

In the Middle Ages burial in churches became common, and the most important tombs of the period are to be found there. These memorials were of various forms, but the favorite was a stone coffin or sarcophagus, on which rested a recumbent figure of the deceased, the whole surmounted by a canopy of great elaborateness and beauty. In modern times tomb architecture has declined, until there is seldom seen a structure which really merits great admiration. The most impressive public monument of this kind in the United States is the tomb of U. S. Grant, on Riverside Drive, in New York City. A.MC C.

Consult Weaver's *Memorials and Monuments, Old and New.*

**Related Subjects.** The reader may consult in this connection the following articles:

Burial
Catacombs
Coffin
Cremation
Embalming
Epitaph
Grant, Ulysses S., page 2572
Mausoleum
Mummy
Napoleon I, page 4066
Pyramids
Sarcophagus
Taj Mahal
Towers of Silence

**TOMBIG'BEE,** a river which rises in the northeastern corner of Mississippi, winds south and southeast through Alabama and joins the Alabama River. These two rivers unite to form the Mobile River (which see). The Tombigbee is 450 miles long and can be navigated 410 miles, as far as Aberdeen, Miss., a manufacturing town whose water power is supplied by this river. Its largest tributary is the Black Warrior.

**TOM'TIT.** See TITMOUSE.

**TON,** in the English system a measure of weight and capacity, equal to twenty hundredweight. In Great Britain and America a standard hundredweight is equal to 112 pounds, and the ton is therefore equal to 2,240 pounds. In America, however, a ton of 2,000 pounds is in common use, the heavier ton being known as the *long ton* and the lighter as the *short ton.* By United States law a ton must contain 2,240 pounds unless otherwise specified. United States customhouses always weigh by the long ton. Coal and iron ore are weighed and sold at the mines by the long ton, but coal is bought by consumers by the short ton. As the wholesalers lose something by waste and shrinkage in transportation and handling, this difference in ton standard practically covers the loss.

The ton as a measure of capacity contains forty cubic feet. It is used for estimating ship cargoes and carloads. See TONNAGE.

**TONE,** a musical term denoting the sound made by the vibrations of a piano, violin, harp or other musical instrument or by the human voice. Tones differ from one another in quality, pitch, intensity and duration. For a full discussion of this subject see MUSIC, page 4021.

**TONGA,** *toh'ngah,* **ISLANDS,** or **FRIENDLY ISLANDS,** an archipelago in the Pacific Ocean lying east of the 180th meridian and between the Fiji Islands and Samoa (see map of Oceania, following page 4336). By the Declaration of Berlin (1886) the islands were constituted a neutral kingdom, but in 1900 a protectorate was proclaimed over them by Great Britain. The archipelago consists of four subgroups and a number of outlying islands, and their combined area is but 390 square miles. The only islands of any importance are Tongatabu, Eua and Vavau; on the first named of these lies Nukualofa, the residence of the native king and the capital of the kingdom. In 1914 the population of the Tonga Islands was estimated to be 23,956; of the inhabitants, 23,121 were Tongans. About half of the people live on Tongatabu, which is 140 square miles in area.

The larger islands have a very fertile soil, and tropical plants grow in profusion. Copra (the dried meat of the cocoanut) and green fruit are the principal exports. Trade is carried on chiefly with Australia and New Zealand, with which the kingdom has regular steamship connection. The native Tongans are among the most civilized of the Polynesians and have accepted Christianity. There are over fifty-five public primary schools in the kingdom and one college.

The main group of islands was discovered in 1643 by Tasman. Friendly Islands is a name bestowed by Captain Cook, who visited the archipelago in 1773 and 1777 and was received by the natives in a cordial manner.

**TONGUE,** *tung,* a flat, muscular organ in the mouth which serves as the principal organ of taste and is an important aid in the formation of sounds and in the process of chewing and swallowing. The tongue, which is composed of muscles running in various directions, is attached to the hyoid bone at its root end; by virtue of this arrangement one can move the front part in many different ways, and use it to stir the food about, push it between the teeth, collect it into small masses and thrust it back into the passage leading to the stomach. The relation of this organ to speech is emphasized in numerous proverbs which have references to the "wagging tongue," the "tongue hung at both ends," etc. In the Bible it is called "an unruly evil, full of deadly poison."

The tongue is covered with mucous membrane, which, on the upper surface, has numerous tiny elevations called *papillae.* These give the organ its rough feeling. The papillae at the back of the tongue are the taste buds (see TASTE). In ordinary health the tongue is a pinkish-red color, but when the digestion is impaired a yellowish coating generally forms. Physicians often look at the tongue to ascertain the patient's condition. In some diseases it turns to a bright red color. Besides muscles and taste buds, the organ has glands which secrete a moistening fluid. C.B.B.

See ANATOMY, and the related subjects there listed.

**TONIC,** *tahn'ik,* a term derived from a Greek word meaning *tone,* is applied to a medicine or other agent that has the power to strengthen, or "tone up," the system. In general, tonics act by increasing resistance, and their action may be direct or indirect. That is, some tonics directly stimulate the stomach, heart or other organ, and others help to correct unhealthful conditions which interfere with bodily vigor.

The medicinal tonics are named according to the special action they are expected to have, as *blood* tonics, *nerve* tonics, *stomachic* tonics, etc. Iron, belladonna, quinine, strychnine and vegetable bitters are standard nerve tonics; digitalis and squill are especially valued as heart tonics; arsenic and cod-liver oil are often prescribed for anaemia, and nux vomica is believed to have a beneficial effect on the stomach.

The nonmedicinal, or general, tonics include baths, fresh air, exercise, massage and the like. In connection with this subject it should be stated that when a person feels the need of a tonic he should consult a physician before taking any drug. Especially should he avoid the numerous patent medicines advertised as blood purifiers, nerve stimulants, etc. C.B.B.

**Related Subjects.** The reader will find further information on the subject in the following articles:

| | |
|---|---|
| Alcholic Drinks | Gentian |
| Arsenic | Life Extension |
| Baths and Bathing | Medicine and Drugs |
| Belladonna | Quinine |
| Bitters | Squill |
| Cold | Strychnine |

**TONKIN, TONGKING,** or **TONQUIN,** *tahn kin',* a French protectorate in the extreme northeastern part of French Indo-China. The name is also spelled TONGKIN, to correspond to the gulf of that name, an arm of the China Sea. It occupies the drainage basin of the Red River, and has an area of 46,000 square miles, which is nearly equal to that of the state of Mississippi. According to an official esti-

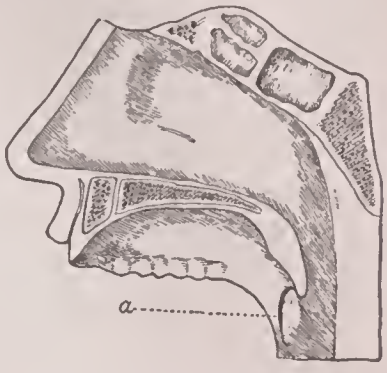
mate, the population was 6,119,720 in 1911. The inhabitants consist of Annamese and various other primitive Asiatics, Chinese and Europeans, the latter numbering about 6,000. Hannoi (which see), the capital of French Indo-China, is the chief city of Tonkin. The principal port, Haiphong, has a fine harbor and is connected with Hannoi by rail. The protectorate has been under French control since 1885, and has been a part of French Indo-China since 1887.

In the delta region of the Red River, a district covering 5,000 square miles, rice, the leading agricultural product, is raised in large quantities. Other products include corn, sugar cane, cotton, coffee, fruits and tobacco. The cultivation of silkworms is an important industry, and silk weaving is carried on at Hannoi and Haiphong. About two-fifths of the raw silk is exported. Copper, coal and iron are mined to a limited extent, but the mineral resources of the protectorate have not as yet been thoroughly exploited. An important transit trade between Hong-kong and the Chinese province of Yünnan is carried on by way of Tonkin, and the foreign trade of the protectorate is rapidly developing.

**TONNAGE,** *tun'ayj,* the carrying capacity of a ship, measured in cubic tons. The gross register contains 100 cubic feet, and this is the unit of measurement used in assessing dock and harbor dues and in fixing the fee for towing. Gross tonnage is ascertained by dividing the volume (number of cubic feet) of the interior of the ship's hull and deck houses by 100. On freighters, forty cubic feet of merchandise is regarded as a ton unless it should happen to exceed 2,000 pounds, in which case payment is by weight. To accommodate a rapidly expanding traffic in ore, coal and grain on the Great Lakes, American builders have produced vessels of enormous tonnage, which are capable of carrying over 16,000 gross tons. They are larger than most ocean freighters. The tonnage of some of the world's great passenger vessels is given in the article Ship.

**TONSIL,** *tahn'sil,* a soft, almond-shaped body lying in the back of the mouth, in front of the pharynx. There are two tonsils, one on each side of the throat. These organs seem to have no special purpose, and when they become inflamed they are a source of pain and annoyance. Not only do diseased tonsils cause tonsillitis and quinsy, but they are often the seat of infection, producing rheumatism and other ailments. The tonsils may be removed without danger, and such removal is advisable if they are permanently affected. See Tonsillitis; Quinsy; Education, subtitle *Hygiene of Education,* page 1946.

**TONSILLITIS** (less correctly spelled Tonsilitis), is a painful disease resulting from inflamed tonsils. It is caused by lodgment of disease germs in one or both of the tonsils, accompanied by a condition of bodily weakness which lessens the patient's resistance to these germs. Overwork, taking cold and dissipation are some of the predisposing causes. Attacks of tonsillitis are most common between the ages of ten and forty. An attack begins with swelling and pain in the throat, and difficulty in swallowing. Fever, violent headache, backache, stiff neck and nausea occur as symptoms in severe cases, and if an abscess forms in the throat the attack develops into quinsy (which see).



A TONSIL
The right tonsil is shown at *a.*

Tonsillitis is not usually fatal, but many recurring attacks tend to make the tonsils permanently diseased, and in that case they are a source of danger to the health. Such tonsils should be removed. (For suggestions on this subject see the subhead *Diseased Tonsils* in the article Education, page 1946.) Mild cases of tonsillitis usually yield to treatment which includes rest in bed, hot or cold compresses on the neck, and the administration of purgatives, but a serious attack should have the attention of a reliable physician. C.B.B.

**TONSURE,** *tahn'shure,* the cutting or shaving of the hair to denote dedication to clerical or monastic life. In the Roman Catholic and Greek churches the act is one of preparation for receiving Holy Orders, and is performed by the bishop. Clerical tonsure was mentioned as early as the fifth century, and in the Middle Ages the practice became universal. Various modes of cutting the hair were adopted in different countries; the *tonsure of Peter* left only a ring of hair around the head, and the *tonsure of James* consisted in shaving the front part of the head from ear to ear.

**TONTY** or **TONTI,** *tohn'te,* Henri de (about 1650-about 1704), an Italian explorer, the trusted companion of La Salle. He was born in

Gaeta, Italy, but joined the French army and saw considerable service. In 1678 he accompanied La Salle to Canada, and two years later went with him on his expedition into Illinois. When Fort Crèvecoeur, near Peoria, Ill., was built Tonty was placed in command, but after La Salle's departure his soldiers mutinied and he retraced his route toward Canada, meeting his leader at Michilimackinac (Mackinac Island) in the spring of 1681. Tonty was also with La Salle in his great trip down the Mississippi River and afterward was in charge of Fort Saint Louis, the stronghold erected at Starved Rock (which see) on the Illinois River.

He was the leader of the Illinois Indians in a campaign against the Senecas, and identified his life with that of the former tribe until 1702. In 1686 he undertook an expedition down the Mississippi to aid La Salle, but did not succeed in finding him. Every report of Tonty which has been preserved speaks of him in terms of highest praise, and his influence with the Indians seems to have been as beneficial as it was strong.

**TOOMBS,** *toomz,* ROBERT (1810-1885), an American lawyer, orator and statesman, member of the Confederate Congress and of the Confederate Cabinet and a Southern brigadier-general. He was born at Washington, Ga., and was graduated at Union College, Schenectady, N. Y., in 1828. After studying law at the University of Virginia he was admitted to the bar, and soon became one of the leading lawyers of Georgia. When the Creek Indian War broke out in Alabama in 1836, he recruited a volunteer company and served as captain under General Winfield Scott. In 1853 he was elected to the Senate and a year later ardently supported the Kansas-Nebraska Bill. As an advocate of secession he withdrew from the Senate after Lincoln's election, and became a member of the Confederate Provincial Congress. President Davis also made him secretary of state, but he resigned to accept the commission of brigadier-general, and was assigned to the command of four regiments of Georgia militia. His regiments fought with distinction in the Seven Days' battles, and participated in the second Battle of Bull Run and in the defense of Atlanta.

At the close of the war Toombs visited Cuba, England and France, and after his return in 1867 amassed a considerable fortune in law practice in his native town.

**TOP,** a popular and interesting toy. The wooden top is a pear-shaped piece of wood, with a metal peg inserted at the small end. A cord is wound from the peg end upward, and the end of the string held between the fingers. The top is then tossed with a quick jerk to the sidewalk, and as the cord rapidly unwinds the top is set spinning. Often boys throw their tops at the one which is spinning to try to strike and split it. The commonest game is to start the tops spinning together to see whose will spin for the longest time. The humming or singing top is made of bright painted tin, with holes cut in the sides through which the air passes while the top whirls. The old-fashioned spool top was made by cutting one end of a wooden spool into a point and inserting a wooden peg through the hole. The top was set spinning by a quick twist of the upper part of the peg, held between the thumb and forefinger. Many fancy tops are shown in toy stores. Some spin for an hour without stopping, others show many changing colors, and some play tunes as they whirl.

**TOPAZ,** *toh'paz,* a lustrous mineral composed principally of aluminum, silicon and fluorine, and occurring chiefly in granite and gneiss. In hardness it ranks between sapphire and quartz. Crystallized, transparent varieties are prized as gem stones, especially the colorless and yellow topazes. Red, blue and green stones also are found. The best specimens of gem topaz are taken from the Ural Mountains, Brazil, India (including Ceylon), Maine, Colorado and Utah. The pure white topaz, when cut and polished, resembles the diamond; the great *Braganza diamond,* one of the Portuguese crown jewels, is probably one of these stones. The finest yellow topaz comes from Brazil; when heated, these stones turn pink, and are called *Brazilian rubies.* To the topaz the ancients attributed power to cure dimness of vision and to dispel gloom, and it is regarded as a peculiarly "lucky stone" for those born in November.

"Firm friendship is November's and she bears
True love beneath the topaz that she wears."

**TOPEKA,** *toh pe'kah,* KANS., the state capital and the county seat of Shawnee County, situated on the Kansas River in a rolling prairie country, sixty-five miles west of Kansas City. It is served by the Atchison, Topeka & Santa Fe, the Chicago, Rock Island & Pacific, the Leavenworth & Topeka, the Missouri Pacific and the Union Pacific railroads. In 1910 the population was 43,684; in 1916 it was 48,726 (Federal estimate). The area of the city exceeds eight square miles.

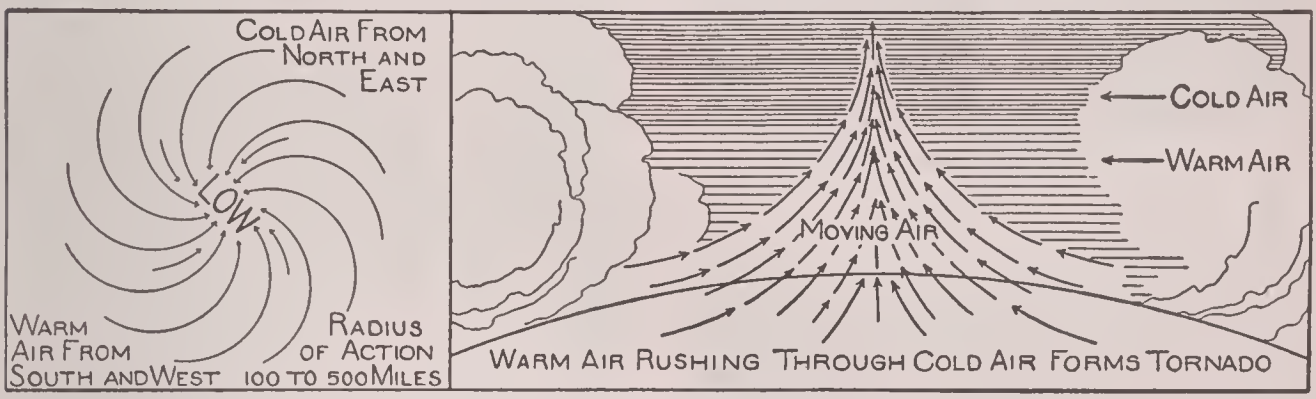
Topeka is an attractive residence city, with a noticeable lack of the usual poorer districts and an abundance of fine shade trees. The state capitol, a large stone building surrounded by attractive parking, is the dominant architectural feature (see panel illustration, page 3203). Other noteworthy buildings are the courthouse, city hall, Federal building and the public library. The city is the seat of Washburn College, College of the Sisters of Bethany, a Protestant Episcopal school for girls and the Kansas Medical College. Benevolent institutions include the state asylum for the insane, the state reform school, Home for Aged Women, and the Detention, Christ, Stormont and Santa Fe hospitals. Of the city parks, Gage (ninety acres) and Central (twenty acres) are the largest. Extensive railroad shops of the Atchison, Topeka & Santa Fe here employ over 2,900 men; the general offices of that road are also here. Industrial plants include creameries, flouring mills, packing houses, machine shops and foundries. Coal is mined in the vicinity, and the city is an important trade center for a large, adjacent agricultural country.

Topeka was founded in 1854 by antislavery settlers from the free states. Two years later the Topeka constitution was adopted by an antislavery convention, and the Topeka government was established, but was subsequently abolished by the Federal government (see KANSAS, subhead *History*). The city was incorporated in 1857, and was chosen as the state capital in 1861. The commission plan of government was adopted in 1909. J.W.K.

**TOPLADY,** *top'la di,* AUGUSTUS MONTAGUE (1740-1778), an English clergyman, author of one of the most popular of all hymns, *Rock of Ages* (see HYMNS AND HYMN TUNES, subtitle *Ten World-Famous Hymns*). He was born at Farnham, studied at Trinity College, Dublin, and in 1764 was ordained a priest in the Church of England. In 1768 he became rector of Broad Hembury, and this post he filled until 1775, when ill health made necessary his removal to London.

**TORNADO,** *tawr na'doh,* a violent whirling storm which occurs with greatest frequency in the central part of the Mississippi Valley, in the months of May, June and July. No atmospheric disturbance known is more violent than the tornado; the record of twenty-five of these storms shows that they caused a damage to property of $15,000,000 and the loss of 1,500 lives. In popular language, tornadoes are often called *cyclones,* but *cyclone,* scientifically speaking, is a general term for several different storms.

Tornadoes usually form within thunderstorms, and they occur on warm days, when the humidity of the air is excessive. The tornado cloud is a densely-black, funnel-shaped mass pointing downward from dark storm clouds in violent commotion. This funnel-shaped cloud is the storm center, and the velocity of its whirling movement is estimated to be two miles a minute. The condition giving rise to such a cloud may be described as a condition of unstable equilibrium in the atmosphere, with a warm layer of humid air next the earth and a cooler layer above it. Some disturbance in the atmosphere causes an upward current in the warm air, and as the current rises a rotary movement is caused by the inrush of cold air from surrounding areas. The whirl is so rapid at the center that a small area of low pressure is produced, the temperature is reduced and condensation of moisture takes place; thus the cloud is formed.




HOW TORNADOES ARE FORMED

Nearly all of these storms move from the southwest to the northeast. They generally travel at the rate of forty or fifty miles an hour, but velocities of 100 miles per hour have been recorded. Though the path of the storm is only a few rods in width, within that path buildings are torn down, trees are uprooted,

heavy bridges are swept away and locomotives are lifted from the track. Tornadoes rarely occur in regions which are mountainous to any degree or where there is little moisture in the atmosphere. B.M.W.

**Related Subjects.** In connection with this discussion of the tornado the reader may consult the following articles in these volumes:

| | |
|---|---|
| Cyclone | Typhoon |
| Hurricane | Whirlwind |
| Monsoon | Wind |

**TORONTO,** *toh rahn' toh,* the capital and largest city of Ontario, and, except Montreal, the largest city in the Dominion of Canada. It lies on the north shore of Lake Ontario, near its western end, and is the terminus or a port of call for practically all steamers on the lake. It is also served by three transcontinental railways, the Canadian Pacific, the Grand Trunk and the Canadian Northern, the last having its head offices in the city. By rail, Toronto is 334 miles southwest of Montreal and thirty-seven miles east of Hamilton. It is forty-one miles north of the mouth of the Niagara River. The site of the city is most attractive. It slopes gently upward from the shore for nearly three miles, then rises abruptly to hills, which have become a beautiful residential section.

**The Harbor.** The harbor, which was originally responsible for the growth of the city, is picturesque. A sandy island, which converts the Bay of Toronto into a natural landlocked harbor, has many attractive spots, and shelters hundreds of canoes, launches and yachts. Toronto, in fact, is noted for its aquatic sports, made possible by this lovely harbor. This was the home of Edward Hanlan, the champion oarsman of the world, and of the famous Argonaut Club. The harbor is also of tremendous commercial importance, and after the organization of the new Harbor Board in 1911 plans were adopted for the expenditure of approximately $24,000,000 for the purpose of improving the water front. These plans include the construction of massive sea walls and new docks, deepening of the harbor, development of a new industrial district immediately east of the harbor, and the creation of a boulevard and park system across the water front. The Harbor Board is composed of five members, three appointed by the city council and two by the Dominion government.

**Commerce and Industry.** Toronto is Ontario's chief commercial center, especially in grain, fruits and live stock. Fruits are by far the most important item brought into Toronto by water. The city is the leading wholesale jobbing center in the Dominion, its trade in dry goods and shoes being especially noteworthy. Some of these goods are imported from the United States, but the largest part are made in Canada. The city is an insurance exchange, and its bank clearings, averaging $2,000,000,000 a year, are exceeded in the Dominion only by those of Montreal. It is noted for its department stores, one of which employs about 15,000 men and women. This is the largest of its kind in the British Empire.

In manufactures Toronto was for years a close second to Montreal, but now seems destined to rank first for years to come. It has more than 1,600 manufacturing establishments, with an average capital of $150,000. Its yearly output of finished goods, valued at $250,000,000, is one-eighth of Canada's total output. It is the great slaughtering and packing center of Canada, and it has a large output of machinery, lumber, books, pianos, carpets, clothing, wall paper, stationery, and various iron and steel products, including stoves, rails and ships. The city's largest establishments make agricultural and other machinery. Power for all these plants is derived chiefly from Niagara Falls through a private company, and also through the Ontario Hydro-Electric Commission. Light and heat are obtained from the same sources.

**Churches and Educational Institutions.** With one church for approximately every thousand of total population, Toronto is often called "the city of churches." Saint Paul's (Anglican) is perhaps the costliest; Saint James Cathedral (Anglican), although erected as early as 1852, is still one of the finest churches of the city. Saint Michael's Cathedral (Roman Catholic), Saint James and Saint Andrews (Presbyterian), the Eaton Memorial Methodist in its beautiful surroundings, the Metropolitan Methodist, noted for its great organ, Jarvis Street Baptist and Bond Street Congregational are notable.

Toronto is the educational center of the Dominion. In fact, the city's most conspicuous buildings are the University of Toronto and its affiliated institutions and the beautiful Gothic of Victoria University. In addition, there are McMaster University (Baptist), Trinity College (Anglican) and Upper Canada College, the oldest secondary school in the Dominion. The city's public schools are noted for their high standards as well as for their splendid buildings. The Technical School, erected at an expense of $2,000,000, is one of the best-equipped schools on the continent. The public library, the largest in the Dominion, with its fourteen branches, many of them in beautiful buildings, has a prominent part in the education of the people. There are numerous private schools.

Toronto is also the center in Canada for education in the arts. It is the home of the Ontario Society of Artists and of the Canadian Art Club, and it has a flourishing art school and a specially large number of musical schools. The students of these schools have contributed by their interest and support to the maintenance of the Mendelssohn Choir and the Symphony Orchestra, two institutions of which the citizens of Toronto are justly proud. The Mendelssohn Choir is one of the best choral societies in the world. It is worthy of note that one of the leading clubs is called the Arts and Letters Club.

**Public Buildings and Other Features.** In addition to the churches and schools, Toronto may boast of its public buildings. The most conspicuous is the city hall, on Queen Street. It was completed in 1899, eight years after the laying of the cornerstone, and cost about $2,500,000. Its massive tower, 300 feet high, holds a clock which is said to be the largest winding clock in North America. The diameter of its face is twenty feet, and its largest bell weighs 11,648 pounds. Second in importance is the Parliamentary building in the Queen's Park, beautifully situated and of an imposing character. The Royal Bank building is the highest building in the British Empire. The new Union

THE CITY HALL

Station, the magnificent General Hospital, the pride of the city, half a dozen other hospitals, Eaton's great department store, and the Arena, the largest auditorium, deserve special mention.

Exhibition Park is the home of the Canadian National Exhibition, an annual event which is famous for its agricultural, industrial and artistic exhibits. Most of the buildings in the park are of red pressed brick with stone trimmings and are practically fireproof. The attendance during the exhibition each September is about one million. The city has many parks, including High Park (335 acres), Humber Boulevard (129 acres) and Riverdale Park (108 acres). Riverdale Park has a zoölogical garden. Hanlon's Point, on the island, and Scarborough Beach, at the eastern end of the city, are amusement parks. The city itself is noted for its beautiful domestic architecture, the thousands of homes with their beautiful gardens making it especially attractive.

**Government.** The government of the city is vested in a board of control (five members, including the mayor) and a board of aldermen. The board of control, whose members are elected each year by the voters at large, is the executive body, and it has general administration of the city's affairs. The schools, however, are controlled by a board of education, elected

by the voters, and the police are under the direction of a board of police commissioners, consisting of the mayor, the county judge and the police magistrate. The board of aldermen, or council, is the lawmaking body.

**History.** The name *Toronto* is of Indian origin. It means *a place of meeting,* and was probably given to the site because it was a rendezvous for Indian councils or war parties. It was then the end of the shortest and most convenient route between Lake Huron and Lake Ontario. During the seventeenth and eighteenth centuries, the history of Canada was the record of a struggle between the French and English for the fur trade. The French control of the Niagara River route led the English to establish Fort Oswego, which was to attract trade from the Northwest. The French countered by building Fort Rouille, in 1749, on the site of Toronto. Ten years later the fort was destroyed, to prevent its use by the English.

Finally, in 1794, Governor Simcoe chose the site for the capital of Upper Canada, and named the new settlement York. It was captured by the Americans in 1813, and some of its public buildings, including the archives, were burned. In 1834, having acquired a population of 9,000, York was incorporated as a city, and its name changed to Toronto. The first mayor was William Lyon Mackenzie. It suffered severe loss during the Rebellion of 1837, and was partly destroyed by fire in 1849 and again in 1904. In the latter year the property loss exceeded $8,000,000. Population in 1911, 376,538; in 1916, local estimate 480,000. Assessed valuation about $600,000,000. G.H.L.

PROVINCIAL HOUSE OF PARLIAMENT

**TORONTO,** UNIVERSITY OF, a coeducational, undenominational institution at Toronto, Ont. It comprises four faculties—those of arts, medicine, law, applied science and engineering. In addition to the usual courses in these departments, the university offers special instruction leading to the degrees of Bachelor of Applied Science, Bachelor of the Science of Agriculture, Civil Engineer, Mining Engineer, Mechanical Engineer and Electrical Engineer. There are also special courses in pedagogy, commerce and household science. The university has an average attendance of about 4,000 students, and a faculty of 400 members. The library contains 150,000 bound volumes, and a third that number of pamphlets. The property of the university is valued at $7,000,000, and its annual income is nearly $1,000,000.

The University of Toronto is in fact, if not in name, a provincial institution, and is at the head of Ontario's public school system. It was founded in 1827 as King's College, under Anglican control, one of its chief promoters being Bishop Strachan. Instruction was not begun until 1843; in 1849 the university was rechartered under its present name and made undenominational. Since 1904 the university has been a federated body. The institutions which are most closely associated with the university, and are for all practical purposes parts of it, are the Ontario Agricultural College at Guelph; the Royal College of Dental Surgeons; the College of Pharmacy; Toronto College of Music; the School of Practical Science; and the Ontario Veterinary College. The federated institutions, whose students may attend lectures at the university, are Victoria University, Saint Michael's College, Trinity College, Knox College and Wycliffe College. University College, organized in 1853, is a part of the university.

TORPEDO, an underwater weapon used in naval warfare for the purpose of destroying enemy vessels. Its name is derived from the Latin *torpere,* meaning *to be asleep,* or *numb,* and is an ironic reference to the "putting to sleep" of an opponent. In several wars within recent years the effectiveness of torpedoes has been demonstrated, but never before with such dreadful and deadly certainty as in the War of the Nations, which began in 1914. It was the cruelest weapon of that war, and to meet the demands for an instrument of the highest efficiency it was improved within two years by the German naval establishment from a comparatively small, though powerful, device to an undersea terror which weighs a ton and a half; in its evolution the cost rose from about $3,000 to over $8,000 for the largest sizes. When considered from the viewpoint of dimensions, it is the most complicated and the costliest piece of mechanism ever devised to kill men and to destroy property.

**The Wonders of the Invention.** The inventive genius of man would seem to have reached the apex of achievement in the torpedo of the present day. At a depth of eight or ten feet below the surface of the ocean it travels as fast as the speed of a passenger train, and this requires a powerful engine, or motor, intricate in detail. If it sinks too low in the water it will pass harmlessly beneath its target; if it rises so high that it advances along on the surface much of its force on explosion is lost into the air. It must therefore possess mechanical means of maintaining a certain level. It must also be so constructed that it will keep a straight course ahead and not be deflected from it; this is accomplished by means of a gyroscope, which will bring it back to its course. In the head of the torpedo there must be an explosive charge powerful enough to tear a hole in the massive steel sides of great merchant vessels or of the mightiest warships.

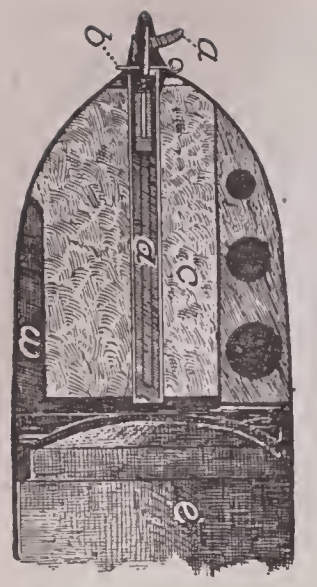
When these necessary elements are considered, it is evident that a modern topedo is an oddly-formed ship which conducts itself with almost human intelligence, and which runs itself, stabilizes itself and guides itself, but without the touch of man after he has dispatched it on its mission.

The most powerful type of torpedo is the Whitehead, and this is the one which has been very generally adopted by all navies. It is about twenty-two inches in diameter and is twenty feet long. It is a harmless-looking, spindle-shaped tube of thin steel, with a tail, but with nothing to suggest the wonderful mechanism and deadly explosive inside of it.

**How It Is Operated.** Most torpedoes are propelled by compressed-air engines; some have been equipped with electric motors, although of the latter variety very few have been made.

There are several compartments in a torpedo, and they screw into each other and form one rigid shell. At the front is the deadly section of the whole device. All after parts are there only to propel the tip of the torpedo against its distant target. The charge cone of the early models held only about fifteen pounds of explosive, but the present models sometimes contain 250 pounds of it. Guncotton is nearly always used, in a moist state. The fuse which ignites the explosive is connected with a tube of dry guncotton. The instant the plunger at the tip of the torpedo strikes a solid object it explodes the charge.

Back of the charge of explosive is a compartment containing compressed air; it has a capacity varying from 10,000 to 20,000 cubic feet —enough to provide motive power to send the torpedo six miles. The next chamber contains the machinery—the large motor which operates the screws, or propellers, and a smaller motor which controls the depth rudders. This chamber is the only one which is not water-tight; it is pierced with small holes to admit water, and this keeps the engine cool. In the rear compartment is the gyroscope, without which not one torpedo in a dozen would hit its mark, for it keeps the instrument of death straight ahead



LENGTHWISE SECTION

on its course. There are twin screws, and these turn in opposite directions. Two hollow shafts connect them with the engine, and through the shafts the spent air from the engine escapes into the water. Thus is the cause of the bubbles and consequent white track so clearly discernible in the wake of the speeding torpedo.

A torpedo may be fired from below the water line or from a height of several feet above it. When fired from above, a cannon tube is used, charged with sufficient powder to project the torpedo into the water. After reaching the water it sinks to the depth of six to eight feet and proceeds towards its destination under its own power. Submarine vessels can launch a torpedo only under the water, either from a shuttle tube which closes at once after the torpedo passes from it, or from a cradle fixed to the side of the vessel. In firing by the latter means the motor is put in motion by a device from the interior of the vessel and this starts the torpedo on its mission. The first method has almost entirely superseded the latter.

The most powerful torpedo can travel about six miles, with a speed of nearly thirty miles an hour, before its power is exhausted. If it be adjusted for shorter distances it can race through the water at the rate of about forty miles an hour for a distance of two or three miles; this gives it a forward movement of about sixty feet every second. Submarines rarely fire at an enemy at a greater distance than a mile, and they attempt to get closer than half a mile to their victims. Within 700 or 1,000 yards there is a fair chance of scoring a hit; at a mile or a mile and a half the chances are slight, while beyond two miles scarcely ever will a torpedo find its mark.

**A Controlled Torpedo.** The above description relates entirely to the class of torpedoes used by all nations up to the end of the year 1917. It has been the hope of many inventors to produce a device by which a torpedo could be sent in any desired direction, thus vastly lessening the chances of a failure in an attack. During the year 1917 it was announced, without attempt at proof and without a public trial, that a means of control by electricity had been discovered. A wireless system, it was claimed, will positively send the torpedo in any desired direction, and its course can be changed at will. The inventor is John Hayes Hammond, Jr., an American who has achieved a reputation as an electrical expert. Whether the invention has been withdrawn for further improvements or whether it has been taken in charge by the government is not known.

**Historical.** In 1585 an Italian engineer blew up an enemy's bridge at Antwerp by floating down the Scheldt a small vessel loaded with powder, which was exploded by clockwork mechanism. The next recorded experiment was nearly 150 years later, when a Frenchman exploded under water several rockets bearing heavy charges of powder and destroyed two small vessels. An American, David Bushnell, was the first man to devise a torpedo which could be called the forerunner of the present type. It was necessary to attach it to the vessel to be blown up, and this necessitated a so-called submarine torpedo

(*a*) Plunger or striking rod
(*b*) Safety pin
(*c*) Guncotton charge
(*d*) Detonating charge
(*e*) Air chamber
(*f*) Charging valve
(*g*) Pendulum
(*h*) Turbine
(*i*) Submergence control mechanism
(*j*) Submergence valve
(*k*) Superheater
(*l*) Valve case
(*m*) Air lever
(*n*) Gyroscope
(*o*) Gyroscope impulse
(*p*) Rudders for horizontal control
(*r*) Rudders for vertical control
(*s*) Rudder controls
(*tt*) Propeller shaft
(*uv*) Propellers
(*w*) Ballast

boat—not a vessel of the present submarine type, however, but a globular affair, holding one man, and intended only as a device to put the operator in close proximity to the vessel to which the torpedo was to be attached. It was a clumsy expedient, and very dangerous.

The first of the modern torpedoes intended to be projected through the water carried no engine. They were tapered wooden contrivances with an explosive head, and were shot at their target at not over one-fourth mile. This early weapon called for small, fleet vessels which could get close to the enemy without detection, and the torpedo boat of the last quarter of the nineteenth century was called into existence. In maneuvering for position from which to strike it was expected that one or more of these boats would be destroyed by gunfire before one of them could launch a torpedo which would find its mark.

The torpedo-boat destroyer was evolved to cope with the torpedo boat; this was also a small vessel, speedier than the torpedo boat, and it performed good service in keeping the latter away from large vessels of a fleet. The destroyers also carried torpedoes, which they could use effectively against the torpedo boats. To-day both classes of vessels are obsolete, for the submarine, with its effective mechanical torpedo, has come and has demonstrated its power; so long as it can run submerged no class of vessels can subdue it. Its most effective foe is a fleet, staunch vessel of light weight called a "submarine chaser," which can speed over the water at forty miles an hour and deliver a shot at a submarine before the latter can submerge beyond the danger line.

The present Whitehead torpedo was invented by an English engineer of that name, soon after the American War of Secession. E.D.F.

Consult Armstrong's *Torpedoes and Torpedo Vessels* (1910).

**TORPEDO,** or **ELEC'TRIC RAY,** a fish of the ray family, found in warm seas, so called because it can discharge electricity from special organs lying in the head and gill region. Its body is flat and broad, dark above and white below, and ends in a slender tail. The torpedo uses its strange power to kill small fish for food; in a full-grown, healthy fish the current is powerful enough to disable a man. After discharging electricity the fish is temporarily exhausted, and needs rest and nourishment before it can repeat the act. How the electric organs become charged is unknown. See ELECTRICAL FISH.

**TORPEDO BOAT,** a vessel equipped to make the torpedo its principal weapon of attack. The object of such a vessel in warfare is swiftly to approach the slower battleship, deliver a torpedo attack and escape, if possible. Torpedo boats have been rendered of less value than they formerly possessed because of the perfection of the submarine and of their successor, the torpedo-boat destroyer. They are made entirely of steel, with light plates of one-sixteenth to three-eighths inch in thickness, and for defense rely principally on the speed with which they can run away from their enemies. The main object of the torpedo boat is to get near enough to discharge its torpedoes under cover of fog, storm or night, and retire before it can be reached by the big guns of the enemy's ships, which would sink it almost instantly. Torpedo boats are fitted with one, two, and sometimes four tubes or guns from which torpedos may be fired, and these tubes are arranged so that discharge may be made in any direction. Being specially constructed for the purpose and too light to carry protective armor of great weight, the torpedo boat carries its coal in such a manner as to afford added protection to the vital parts of the vessel. Such a vessel requires from 150 to 240 men to navigate and operate it.

The introduction of torpedo boats was followed by torpedo-boat destroyers, whose duty it was by their still greater speed and strength to pursue and capture or destroy the torpedo boats before they could deliver their attacks. Their ability to do this also proved their own fitness to deliver torpedo attacks, and the building of torpedo boats practically ceased. Many hundreds of them are yet in commission in the navies of the world. See TORPEDO.

**TORQUEMADA,** *tohr ka mah' thah,* TOMAS DE (1420-1498), an inquisitor-general of Spain. He was born at Valladolid, and became a friar preacher in the Dominican convent in that city. For twenty-two years he held the priorship of the convent at Segovia, and was confessor to Isabella, afterward queen of Spain. In 1479 the Inquisition was established in Spain; Torquemada was made assistant to the inquisitors, and in 1483 inquisitor-general over all Spanish possessions.

Not only for religious reasons, but for political considerations, also, he was extremely zealous, for he felt that the suppression of heretics was the only way to bring about the political unity of Spain. He was inquisitor-general for fifteen years, and during that time sen-

tenced to death over 10,000 persons. His severity was rebuked by the Pope, and he had frequently to send embassies to Rome to defend his methods. He took part in the expulsion of the Moors from Spain, and was largely instrumental in driving the Jews from the country. The Jews had been the most flourishing commercial class of Spain, and the loss to the country was inestimable. Torquemada was intensely unpopular, and never dared appear in public without a strong guard.

**TORRENS,** *tahr'enz,* **SYSTEM,** a system of registering titles to real estate, devised by Sir Robert Torrens, who introduced it into South Australia in 1858. The system rapidly gained favor in the other colonies, and by 1874 was in use in each of the colonies of Australia, in Tasmania and in New Zealand. It has since been introduced into Canada and other British colonies, the United States and many of the countries of Europe. The purpose of the system is twofold:

(1) To make the transfer of landed property as simple and safe as that of other property.

(2) To do away with the repeated examination of titles.

The system is operated through a bureau or court of registration in charge of a registrar, with whom in most cases is associated an examiner of titles.

**Getting the First Torrens Title.** The first step towards having one's land registered consists in filing with the registrar a petition for registration. With the petition the applicant must file all records in his possession relating to the title. He must also give in writing under oath a statement of all encumbrances; that is, of debts secured by mortgage or liens, and of all delinquent taxes. These papers are referred to the examiner of titles, who proceeds to verify them. If other persons are interested in the property by marriage or otherwise, the law requires the registrar to notify them of the petition and give them an opportunity for a hearing. In short, everything possible is done to learn all the facts bearing upon the title under consideration. When this work is completed the examiner of titles makes his report to the registrar.

**The Certificate.** If the registrar is satisfied that the title is perfect he files away all the old papers and issues a certificate which declares that the land is the property of the registered owner, subject only to the encumbrances described on the certificate. The certificate must be signed by the registrar. It is issued in duplicate, the official copy being filed in the office of the registrar and the other being given to the owner. The official certificate becomes the title of ownership and is *indefeasible;* that is, it cannot be set aside or overcome. In case of transfer of the property no further examination of the title is necessary, but it is always wise to inquire of the registrar whether any notices of encumbrances have been received and not registered. The first certificate is cancelled and a new one issued, and this completes the transaction.

**Insurance Fund.** In case an interest in the property is found, or a just claim to it arises which was not discovered at the time the certificate was issued, the holder cannot be dispossessed of the property, but the holder of such an interest or claim may be paid from a fund created for that purpose by a small assessment on the property at the time of each registration. The rate varies in different states and countries, but it is usually one-tenth of one per cent on the valuation.

**United States.** The first Torrens act in the United States was passed by the legislature of Illinois in 1895. The act was declared unconstitutional by the supreme court of the state because it conferred judicial powers upon the registrar and examiner of titles. In 1897 another law was passed without these objectionable features. From time to time the system has been introduced into other states, but the progress has been slow owing to the complicated systems in the older states, which seem difficult to replace. Since each state has its own system of registering titles the Torrens acts vary in different states as to minor points, but they are uniform respecting their main features.

**In Canada.** A system of land registration based upon the Torrens system was adopted by Vancouver Island in 1861. When Vancouver became a part of British Columbia in 1866 this system was continued over the entire province. The system is the only one used in Alberta and Saskatchewan and is in very general use in Manitoba; it went into effect in Nova Scotia in 1907. The Ontario law adopted in 1885 is based on the English Land Act of 1875, and provides for three grades of certificates—absolute, qualified and possessory. W.F.R.

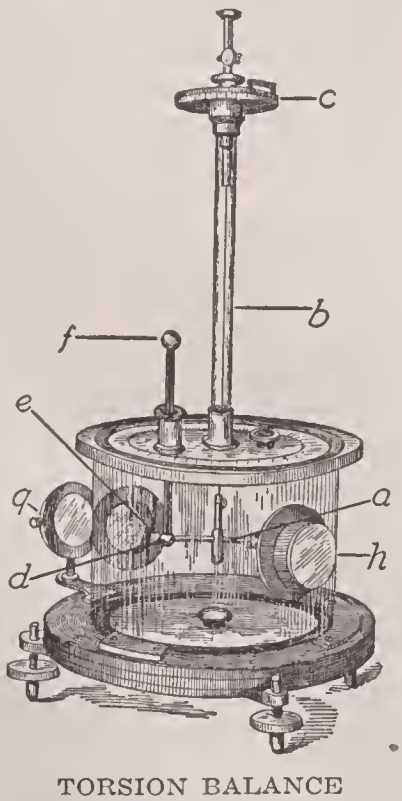
Consult Cameron's *The Torrens System;* Thom's *The Canadian Torrens System.*

**TORRICELLI,** *tahr re chel'le,* EVANGELISTA (1608-1647), an Italian scientist, famous for the discovery of the law of the barometer. (For explanation and illustration of this law, see

BAROMETER, page 597.) Torricelli was Galileo's assistant during the last three months of the philosopher's career, and on Galileo's death he succeeded him as professor of philosophy and mathematics at Florence. He improved the microscope and telescope, and made several important discoveries in mathematics and physics. In 1908 the tercentenary of Torricelli's birth was celebrated in Italy.

**TORRINGTON,** *tahr'ing tun,* CONN., a town in the northwestern part of the state, in Litchfield County, thirty-five miles west of Hartford and 107 miles northeast of New York City. It is on the Naugatuck River and has transportation facilities over the New York, New Haven & Hartford Railroad and interurban lines. The area is about two and a half square miles. The chief features of the place are Coe Memorial Park, the Federal building, a Y. M. C. A. building, public library and Hungerford Memorial Hospital. The manufactures are varied and include brass, machinery, needles, automobile accessories, hardware, woolen goods and marine engines. Settled about 1737, Torrington, named for Torrington, England, was incorporated as a town in 1740 and chartered as a borough in 1887. It was the birthplace of John Brown. Population in 1910, 16,840; in 1916, 19,597 (Federal estimate). F.M.J.

**TORSION, BALANCE,** an instrument for measuring very small forces. It consists of a horizontal bar, *a,* suspended by a thread of silk or other substance, *b,* so that it will balance. Threads of quartz are most generally used for the purpose. The upper end of the thread is attached to a graduated head, *c,* by whose rotation the intensity of the force is measured.




TORSION BALANCE
Explanation of the figure appears in the text.

The operation of this balance may be illustrated in the measurement of an electric current. The two balls, *d* at the end of the bar, and *e* at the end of the rod *f,* are in the position shown in the illustration, and the pointer on the graduated disk is at 0°. The balls are then charged and the electricity forces them apart. By looking through the telescope, *h,* one may see their divergence in the mirror, *g.* The graduated head is then turned until the torsion (twisting) of the thread is sufficient to bring the balls back to their former position. By previous testing the force exerted upon the thread by a complete rotation of the graduated head is known, so that the force exerted by any number of degrees may be readily determined. See GALVANOMETER.

**TORT,** *tawrt,* a legal term derived from the Latin *torquere,* meaning *to twist,* or *wrest aside.* It has been defined by various authorities as a private or civil wrong or injury independent of contract, a breach of a legal duty, and a violation of anyone's right to personal security, to liberty, to property or to reputation. The chief distinction between a tort and a breach of contract is that the former involves a greater degree of moral guilt, though there are cases in which action could be brought on either ground. For example, a person who buys a ticket of a railroad virtually enters into a contract with the road whereby he is guaranteed a certain amount of safety. If one of its employees attacks him, the injured passenger can sue for damages on the ground of assault (an action in tort) and also for breach of contract for transportation.

Tort differs from crime in that the latter is an offense against the state and not the individual. *Torts* is the term used to designate the branch of law which treats of the redress of injuries not classified as crimes or as breaches of contract. In this branch are included slander, libel, trespass, alienation of affection, nuisance and negligence.

**Related Subjects.** In connection with this subject the reader should consult the following:

| | |
|---|---|
| Assault and Battery | Negligence |
| Contract | Nuisance |
| Crime | Slander |
| Libel | Trespass |

**TORTOISE,** *tawr'tus,* or *tawr'tis,* a group of reptiles belonging to the same order as the turtles, but distinguished from the latter in that they live on the land. They have short, unwebbed toes, and the hind feet, which are club-shaped, suggest an elephant's when the tortoise is walking. The upper part of the shell, or carapace, is heavy and highly arched, and is firmly joined to the under part at the sides of

the body. There are three species of tortoise in the United States, the most important of which is the *gopher* tortoise, found from South Carolina to Florida and as far west as Texas. It is a clumsy, slow-moving creature, of a dull brown color. An average specimen weighs about nine pounds and has a carapace eleven and one-half inches long and eight inches wide. This tortoise frequents dry, sandy areas and digs a long underground tunnel, which serves as a retreat in bad weather. A race of giant tortoises, now nearly extinct, formerly inhabited the Galapagos Islands and other sea island groups. See TURTLE.

**Tortoise Shell,** a beautiful, partly transparent substance used in inlay work and in making combs, boxes, buttons, spectacle rims and various ornamental objects. Though the name *tortoise* is properly applied only to land turtles, tortoise shell is produced from the horny plates of certain species of sea turtles, notably the hawksbill. The plates are so thin that it is necessary to weld a number together, and this is accomplished by heating them in oil or boiling them in water. By this process they become soft and can then be joined together through heat and pressure, and molded into desired forms. Genuine tortoise shell is very expensive, and is imitated in horn and celluloid. It takes a high polish and is marketed in various shades of brown, variegated with patches of clear, amber yellow. G.B.D.

Consult Ditmars' *Reptiles of the World.*

**TORTURE,** *tawr'ture,* the infliction of severe physical pain by the use of the rack, scourge, stake and other instruments and devices. The American Indians and other primitive peoples were accustomed to inflict torture on captured enemies, but civilized nations, as well, have not scrupled to make use of this practice, both in religious and civil procedure. In Europe in the Middle Ages torture was commonly resorted to by Church and state to procure confessions of guilt and to punish offenders, and among its victims were such men as Savonarola and John Huss. By the sixteenth century public sentiment had been generally aroused against the practice, but it lingered in various sections of Europe until the early part of the nineteenth century, and even as late as the Russian revolution of 1917 flogging was the lot of Siberian exiles. The various devices and methods that have been employed by torturers are numerous and complicated, and it would seem that human ingenuity could have gone no further in devising ways of inflicting bodily misery. For a peculiar method of deciding the guilt or innocence of an accused by torture, see ORDEAL AND COMBAT, TRIAL BY.

**TORY,** *toh'ri,* from the end of the seventeenth until the end of the nineteenth century, the name of one of the two great political parties in Great Britain. The word is derived from the Irish *Tar a Ri,* "Come, oh king!", a call familiar to the Irish loyalists who fought for King Charles I. Under the Commonwealth almost any kind of a bandit or outlaw was a *Tory,* and after the revolution of 1688 the term was freely applied to the Irishmen who waged a guerilla warfare on behalf of King James II. Tory was about the most offensive epithet in the vocabulary of an English Protestant.

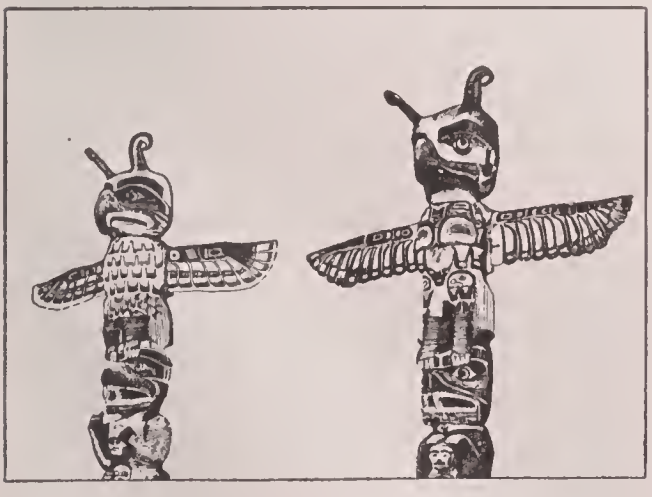
Meanwhile the word was used in a political sense, one which is more familiar. After the Restoration there was a "country party" and a "court party," but in 1679, when Charles II was in the midst of his quarrels with Parliament, these parties called each other the worst names they could think of—*Whigs* and *Tories.* To call a man a Tory was to class him with the Irish bandits, and the term was used in derision of the members of the court party, who refused to support the bill for the exclusion of the Duke of York, later James II, from succession to the throne because he was a Catholic. In time the origin of these words was forgotten, and they became the official party titles.

During the eighteenth century the Tory party included most of the small landowners and the clergy, while the Whigs were the landed aristocracy and the merchants and small tradespeople. Under George III the Tories managed to curb the power of the great Whig landowners, who had controlled Parliament through "rotten" or "pocket" boroughs. They now naturally relied on the power of the Crown and through the influence of the younger Pitt added the principle of reliance on the people. The French Revolution upset this arrangement. The new democracy, which quickly spread to England, was too bitter a pill for the landed interests as well as the king, and the ranks of the Tories soon included most of the former Whig landlords. The Whigs now became the party of progress, while the Tories, in spite of Pitt's efforts, became identified in the minds of the people with the general principle that the existing state of affairs was satisfactory. After the Whigs secured the passage of the Reform Bill of 1832, the Tories ceased to be a power, but their place is practically filled by the Conservative party of the present time.

In the American colonies, before and during the Revolution, any person who was known to have or was suspected of having loyalist sympathies was called a Tory by the colonists who favored independence. W.F.Z.

**TORY,** Henry Marshall (1867- ), a Canadian educator, first president of the provincial University of Alberta. He was born at Guysboro, N. S. As a young man he studied at the Wesleyan Theological College, Montreal, and in 1889 was admitted to the ministry. The next year he spent in study at McGill University, and by 1893 he was convinced that the ministry was not the place for him. So he resigned in 1893, and for fifteen years taught mathematics at McGill, for the last five years being assistant professor. In 1908 he was called to organize the new University of Alberta, a task which he carried to completion with marked ability. Dr. Tory's work at the university has made him one of Canada's leading educators.

**TOTEM,** *toh'tem,* among various primitive peoples an object regarded as the symbol of a tribe, clan, family or individual. The totem may be a bird, fish, beast or any other object, though usually an animal is selected. Sometimes the totem is looked upon as the tribal ancestor, as in the case of an Australian tribe which reveres the emu as the sacred totem of the group. Members of this tribe believe they are all related by blood because of their descent from the emu, and intermarriage within the group is forbidden. The wilful slaughter of an emu by any one of the members is unknown. The subject of totemism has been a fruitful source of study among authorities for many years, and it is evident that it has both social and religious aspects. The practice of carving totem figures on poles (see accompanying picture) is common to many North American tribes. Among the Indians of the Pacific coast from Vancouver to Alaska totem poles are often made by carving the trunks of cedar trees

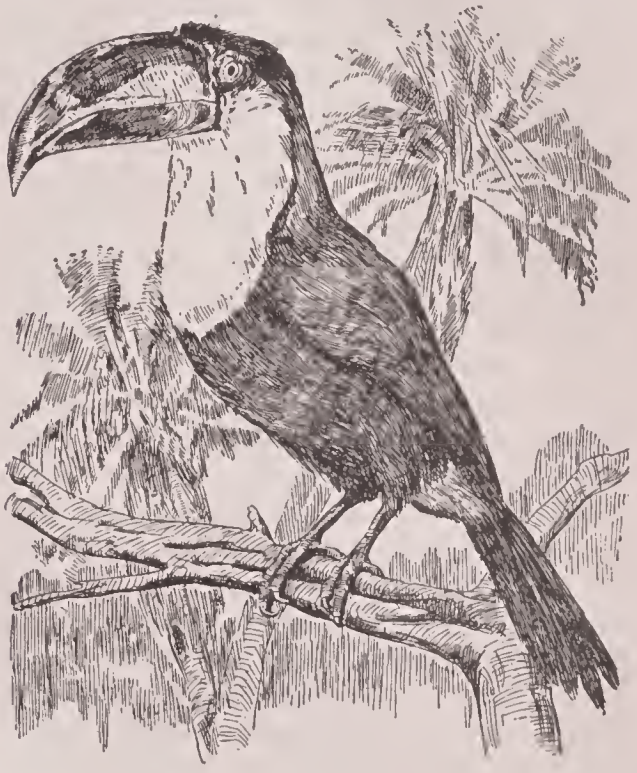


TOTEM POSTS

Grotesque totem posts in front of an ex-chief's house of the Kwakiutl Indians, Alert Bay, a remote region near the northern end of Vancouver Island.

Consult Lang's *The Secret of the Totem;* Gomme's *Folklore as an Historical Science.*

**TOUCAN,** *too kahn',* a bird of tropical and semitropical America, which has an enormous bill, a thick, short body and short legs. The upper mandible is curved over the lower and is notched at the edges. The tongue, also, is curiously flattened and notched, and the bird's tail is joined to its body by a ball-and-socket joint which permits of its being raised above its back with a jerk, as if operated by a stiff spring. Toucans are brilliantly colored; their black or green bodies are marked with red, orange, white or blue, and the bills are crossed with vivid bands. They feed on fruit and are often destructive to orange plantations. Their eggs, pure white in color, are deposited in holes in trees.



THE TOUCAN

**TOUCH,** one of the five special senses, the one which gives to the individual his most intimate knowledge of objects in the world about him. He may judge the color and general shape of an object by looking at it, but he can learn just how rough or how sharp or how soft it is only by feeling of it. This tactile sense is perceived through the stimulation of sensory nerves which have their end organs in the skin

and the mucous membranes. The delicacy of the sense varies in different parts of the body. It is most highly developed on the tip of the tongue and least developed on the back of the shoulders. The tips of the fingers and end of the nose are other sensitive areas. In such regions the end organs are very numerous. Scientists measure the acuteness of this sense by using an instrument having two needle points operated like the points of a compass. In a section of great sensitiveness these two points can be separately felt when but a fraction of an inch apart. The distance at the tip of the tongue is 1.1 millimeters (about $\frac{1}{25}$ inch), as compared with 66 millimeters (about 2.6 inches) on the back of the shoulders.

The sense of touch is very closely related to pain and temperature sensations, and some authorities consider these latter to be varieties of touch sensations. As is known from common experience, slight pressure can be increased until the original sense of touch becomes definitely a sensation of pain, and sensations of warmth and cold are experienced by certain points on the skin. Authorities have located 30,000 spots on the skin of the trunk and limbs from which the sense of warmth is conveyed to the brain, and over 200,000 "cold spots" have been identified. The importance of developing the tactile sense is recognized by modern educators, and touch exercises have a place in all kindergarten and Montessori schools. In the acquisition of knowledge touch is as important as sight. It is through the training of this sense that Helen Keller, blind and deaf from infancy, can read, write and speak. C.B.B.

See SENSES, SPECIAL, and the list of related subjects there given.

**TOULON,** *too'lon,* the chief naval port of France on the Mediterranean coast, situated about forty-two miles southeast of Marseilles. At Toulon, in 1793, Napoleon first rose to eminence as commander of artillery, when the fort was retaken by the French from the British. Its docks have an area of 740 acres, and there are eighty acres of deep-water floating docks, which will hold the largest ships. The city has two sections—the older one, in the southern part, with narrow, crooked streets, and the newer one, with fine avenues, modern buildings, public squares and a beautiful promenade. The vast marine hospital, the arsenal, covering 650 acres, the Church of Sainte Marie-Majeure and the museum, in Renaissance style, are points of interest. The chief industries are shipbuilding, lace making, fishing, the cultivation of grapes and iron and copper founding. Population in 1911, 104,582.

**TOULOUSE,** *too looz',* an important commercial and industrial center of Southwestern France, capital of the department of Haute-Garonne. It is situated on the Garonne River and at the junction of the Latéral and Du Midi canals, and is 130 miles southeast of Bordeaux and 443 miles southwest of Paris. Though Toulouse has many narrow, poorly-paved streets, a system of wide boulevards extends from the city to its suburbs, and there are a few fine avenues within the municipality.

The city streets radiate from a central square called the Place du Capitole. Within this square is the old town hall, the seat of an ancient literary institution (dating from 1324) called the Academy of the Floral Games. Its members participate in annual poetical tournaments. Toulouse has a number of fine churches, and is the seat of several educational institutions, including a university founded by Pope Gregory IX in the thirteenth century. The municipal library has over 213,000 volumes. The city has an extensive trade in grain and wine, and manufactories of tobacco, cannon, vehicles and farm machinery. Population in 1911 (including suburbs), 149,576.

**TOURGÉE,** *toor zha',* ALBION WINEGAR (1838-1905), an American novelist, born at Williamsfield, Ohio, and educated at the University of Rochester. Before his graduation he enlisted in the Federal army; he was wounded at Bull Run, given a furlough and later taken prisoner at Murfreesboro. At the close of the war he entered the legal profession, and in 1868 was appointed judge of the superior court of North Carolina. In 1897 he was made United States consul at Bordeaux, France, and six years later was transferred to a similar position in Halifax, Nova Scotia. Tourgée's numerous works are chiefly concerned with the Ku-Klux Klan and other phases of Reconstruction times in the South. *A Fool's Errand,* a Ku-Klux story, is the best known of his books, and among the others are *An Appeal to Caesar, Bricks without Straw, Hot Plowshares* and *Black Ice.*

**TOURMALINE,** *toor'ma lin,* a common but beautiful mineral which crystallizes in the hexagonal system and is found chiefly in granite, gneiss and mica schist. The mineral is harder than quartz and will easily scratch glass, but its exact constitution has not been determined by scientists. There are three types of tourmaline, differentiated according to the oxides present—the black, or iron, tourmalines; the brown,

or magnesia, and the alkali tourmalines of rich reds, greens and blues. The latter sometimes occur as beautiful, transparent gems. Pink and red tourmaline gems are known as *rubellite,* or *Siberian ruby;* the colorless, as *achroite,* and the blue and green stones as *indicolite,* or *Brazilian sapphire.* Often in the same crystal there will be two or more contrasting colors, either sharply distinct or blended, and frequently the color differs as the light strikes the prism lengthwise or crosswise.

Bright-colored tourmalines occur in San Diego and Riverside counties, Cal.; the mines in these regions were exploited to meet the expected demands of the Panama-Pacific and San Diego expositions in 1915. Blue and green stones are found in gem pockets in the quarries of feldspar and other rocks in Connecticut, Maine, Massachusetts and New Jersey, and black and brown crystals are found in New York quarries. The Ural Mountains, the island of Elba, Brazil, Maine (in the vicinity of Paris), Siberia and Ceylon are famous for bright-colored tourmalines, and much of the achroite also comes from Elba. Blue varieties are found in Sweden, and the black stones occur in Norway, England, Greenland and the Tyrol.

The interesting physical properties of this mineral have made it useful as well as ornamental. By heating and friction it is rendered highly electric and it is valuable as a conductor. Transparent tourmaline is also one of the few substances which obstruct some of the vibrations of light, a condition that produces polarization of light. For a full explanation of this phenomenon see Polariscope and Polarization of Light, and accompanying pictures, pages 4730 and 4731.

Consult Kunz's *Gems and Precious Stones of North America.*

**TOURNAMENT,** *toor'na ment,* or **TOURNEY,** *toor'ni,* the name given in medieval times to the mimic battles of mounted knights who displayed their military prowess by fighting each other with blunted lances or swords. A tournament was usually arranged by some prince who sent a king-of-arms or herald to foreign courts, and through his own dominions, announcing the "clashing of swords in presence of ladies and damsels." The combat took place on horseback, and a knight generally carried a glove or some other emblem of his lady's favor. Minute regulations were enforced which lessened the danger of the tourney. *Jousts* were single encounters between two knights, and in every tournament there were a great many jousts as well as combats between parties of knights. The tournament is said to have originated in the tenth century. The first combats were held in France, but the custom spread to England, Germany and the south of Europe. The most celebrated English tournaments were held in the tilt-yard near Saint James's, Smithfield, London.

**The Modern Tournament,** an affair held by soldiers or athletes to exhibit their training in the use of arms and accouterments, and their skill in military maneuvers, games and sports. Series of games lasting several days are also called tournaments, as tennis and golf tournaments. The modern carnival or pageant is often in error called a tournament.

**TOURNIQUET,** *toor'ni ket,* an appliance used to check bleeding in case of a wound or in amputations. A simple tourniquet, for use in case of emergency, can be made from a cord, handkerchief or other piece of cloth. If the wound is a cut artery—and in that case bright red blood will spurt out in jets—tie the cloth around the limb above the wound, slip a short stick into the loop and twist the stick until the bleeding is checked. A stone laid above the cut under the bandage will aid in increasing the pressure at this point. It is best not to permit the tourniquet to remain unloosened for more than half an hour at a time, for it is liable to cause congestion. If nothing is at hand to make a tourniquet, compress the bleeding vessel with a padded key or even the finger. If the hemorrhage is from a cut vein, causing an even flow of dark red blood, apply the tourniquet below the wound.

Surgeons' tourniquets are of various forms. One of these is a semicircular piece of metal used in compressing the aorta in the abdomen; another is a piece of flat rubber tubing, which is wound around the limb several times; still another consists of a padded strap to compress the artery, a band which is fastened around the limb, and a bridgelike device over which the band passes. This bridge is raised by a screw when it is desired to tighten the band. See Bleeding.

**TOURS,** *toor,* an attractive city in the north-central part of France, famed in history as the scene of a decisive battle fought in 732 between the forces of Charles Martel and the Saracens. On this battle field the Christian civilization of Europe was saved from Mohammedanism (see Fifteen Decisive Battles). Tours lies in the pleasant valley of the River

Loire, in the department of Indre-et-Loire, of which it is the capital. It is 145 miles southwest of Paris. Among the prominent features of the city are handsome boulevards, a public square containing the imposing Palace of Justice, a beautiful French-Gothic cathedral begun in the twelfth century, and many fine statues of eminent men. In the vicinity are the ruins of a château of Louis XI. There are a number of art schools, museums and other educational institutions in Tours, and a public library of 170,000 volumes. The important industrial establishments include printing works and manufactories of steel, silks, leather goods, pottery, chemicals and machinery.

Tours is the Caesarodunum of the ancient Romans. It attained great prominence as a center of silk manufacture in the fifteenth century, and was often the meeting place of the States-General. In 1871, during the Franco-German War, it was occupied by the Germans. Population in 1911, 73,398.

**TOUSSAINT,** *too saN'*, FRANÇOIS DOMINIQUE (1743-1803), a statesman, revolutionist and patriot of Haiti, known as TOUSSAINT L'OUVERTURE. He was a full-blooded negro, born in Haiti of slave parents. When affairs in French Haiti became troubled after the outbreak of the French Revolution, Toussaint became a leader in a slave rising, but when the National Convention in France proclaimed freedom to all the slaves he came with his forces to the assistance of the French against the Spaniards. By 1796 he had won such confidence that he was made commander-in-chief of the French troops on the island, and drove out the British, who by that time were attempting conquest.

Three years later a sharp struggle took place between the negro and the mulatto population, and at its close Toussaint, leader of the former, found himself the real ruler of the island. He exercised a wise and beneficent sway, and the island had a period of almost unprecedented prosperity; but Napoleon I, the dictator of France, saw in the elevation of Toussaint to the Presidency of Haiti a step toward independence, and sent an army to compel submission. By false promises Toussaint was induced to submit, and was then treacherously seized and carried to France, where he died in captivity.

He was a true patriot and an upright man, to whose noble qualities Wendell Phillips did full justice in one of his most famous speeches, *Toussaint L'Ouverture.*

Consult Mossell's *Toussaint L'Ouverture: The Hero of Saint Domingo.*

**TOWER,** *tou'er.* Towers have been built from early times as places of defense, as observation points, as ornamental structures and for other purposes. They have served as prisons, as places of refuge, as campaniles and as

MEDIEVAL AND MODERN TOWERS
(*a*) Bell tower of the cathedral at Seville, Spain; (*b*) tower of the Metropolitan Life Insurance Building, New York City, reaching forty-six stories above the sidewalk.

lighthouses, and they have been built as single edifices and as parts of churches, mosques, fortifications and castles. In addition to the accompanying illustration, the use of the tower in modern building is shown on page 322, in an illustration of the Woolworth Building, New York City. Some of the beautiful towers of great cathedrals are pictured in the article CATHEDRAL, page 1228. Among other famous towers are the *White Tower* of the Tower of London; the *Eiffel Tower* in Paris, the highest structure in the world; the leaning *Tower of Pisa,* and the *Campanile* at Florence.

**Related Subjects.** For descriptions and illustrations of various towers see the following articles:

| | |
|---|---|
| Architecture | Minaret |
| Campanile | Pisa |
| Eiffel Tower | Round Towers |
| Lighthouse | Tower of London |

**TOWER OF LONDON,** a group of buildings comprising an old feudal fortress and a prison, now used by the British Department of War as an armory. It is to the east of London, on the north bank of the Thames, and just outside the limits of the old walled city. The shallow moat includes a space of thirteen acres, which is surrounded also by a high wall, and within

are the grim buildings with their enormously thick walls, the whole forming a stronghold which could well have resisted an army.

The oldest of the structures is the central White Tower, built in the time of William the Conqueror on the site of an earlier fortress, dating, according to some authorities, from the rule of Julius Caesar. Some of the early kings of England held their court in the Tower, each adding something to the fortifications; but it is chiefly for its history as a prison that the great group is interesting. Many distinguished prisoners were led forth from one or another of its buildings to execution, and a large number of these, including Sir Thomas More, Anne Boleyn, Lady Jane Grey and Catharine Howard, lie buried in the Tower Chapel. Sir Roger Casement, the leader of the Irish rebellion of 1916, was confined in this historic prison until his execution.

To-day, besides arms sufficient to fit out a large army, the Tower contains the royal jewel office, with its treasures of gold and precious

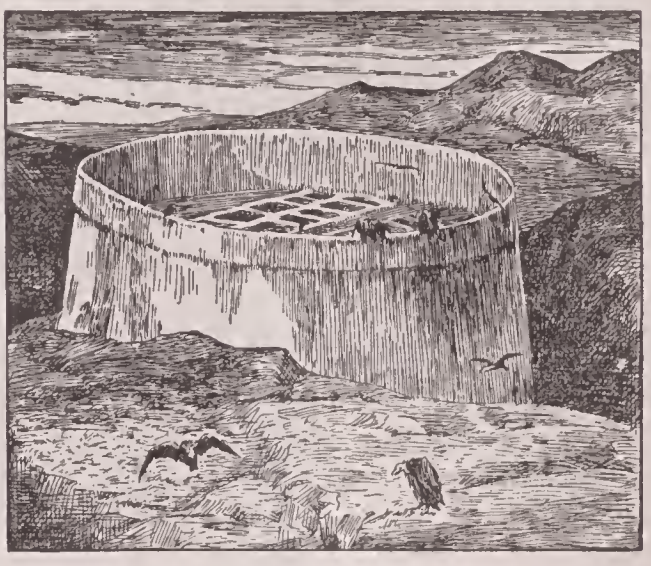
THE TOWER OF LONDON

stones. Visitors are admitted, and find much to interest them, though the associations of the place are almost uniformly tragic.

Consult Harper's *The Tower of London: Fortress, Palace and Prison.*

**TOWERS OF SILENCE,** circular structures of stone, brick or cement, about twenty or thirty feet high and much greater in diameter, erected by the fire worshipers of Persia and the Parsees of India. They are followers of Zoroaster, and do not believe in burial. In these towers the bodies of the dead, exposed to the sky, are placed upon grates above deep pits, into which the bones fall after vultures, which constantly hover over them, have devoured the flesh. The ancient towers were rectangular in shape, and in some the bodies were placed upon stone slabs from which ducts led to the pit.

This method of disposing of the dead has been practiced for over two thousand years, and the custom is still observed by many who have not yet adopted Christianity. There are about



ONE OF THE TOWERS OF SILENCE

94,000 Parsees in India, all but 7,000 of whom live in and near Bombay, where there still remains one of their towers of silence. It is requiring energetic action on the part of the English government to prevent the extension and practice of this custom in India.

**TOWN MEETING,** an annual assembly of the voters in the New England township. In its practical operation the township system is the purest form of democratic government known, because it is government by the people themselves, not government by their elected representatives. Once a year a town meeting is held, which is attended by the male inhabitants twenty-one years of age and over. At these meetings selectmen, school officials and other officers are elected, town laws are enacted, taxes are voted for the coming year, and local improvements and other business matters are discussed and decided. A record of all business transacted is made by the town clerk. The township system is a typical New England institution. In the Southern and Western states the administrative unit is the county, and in some sections outside of New England one finds a mixture of the two systems. The town meeting as it is conducted in New England is a survival of colonial days.

**TOXICOLOGY,** *tok si kol' o ji,* from two Greek words, *toxikon,* meaning *poison,* and *logia,* meaning *account,* is the name applied to that medical science which includes all subjects relating to poisons. It treats of their nature, effects, detection and antidotes, and the legal questions which involve poisoning. For

example, in the case of a sudden and suspicious death, it is the toxicologist's duty to determine whether death was from poison; if so, what the poison was, and whether it was administered knowingly or was accidentally taken. See Poison; Antidote.

**TOXINS,** *tok'sinz,* poisonous substances created in the body by germs. According to a generally accepted theory these poisons are the cause of anthrax, diphtheria, meningitis, lockjaw and various other so-called germ diseases. Toxins are of special interest to the scientist because the study of their poisonous properties has made possible certain preparations called *antitoxins,* which neutralize or prevent their evil effects.

**Related Subjects.** The reader is referred to the following articles in these volumes:

Antitoxin
Bacteria and Bacteriology
Disease, subhead *Germ Theory of Disease*
Life Extension
Medicine and Drugs

**TOYS.** The desire to imitate the action of his elders is born in every child. The tiny girl must "mother" something, must play the housewife or the teacher; the little boy must be an engineer or a fireman, a farmer or a policeman; and it is of this universal desire that the necessity for toys is born. Toys are artificial helps in this universal mimicry, and if they are not furnished, substitutes for them, however crude, will be devised by the children. If the little girl has no cups and saucers for her afternoon tea party, acorns and leaves can be made to take their places; if the small brother has no hobbyhorse, a chair and a rope furnish an acceptable substitute.

**The Right Kind of Toys.** The judgment of those who have made a study of children and their play favors decidedly the acorn cups and the chair horse rather than too elaborate substitutes. Occasionally a child is found who seems to be completely lacking in the happy faculty of "make-believe." He can see only what is there, can hear only actual sounds. He cannot in imagination clothe the broken kitchen chair with glossy hair and waving mane, or hear the fierce growls of the dragon that lurks in the dark under the table. Such a child demands elaborate toys that leave no details to be supplied.

But the ordinary child is not thus handicapped. Give him a hint, and the rest follows as if by magic. The sofa can be a ship or a cave in the desert, a soldier's cot or a king's throne, all in the course of an hour; the roughly-hewn wooden figure can be a robber chief or an Indian, a hero or a villain, and can actually look, to the child's eyes, like every one of these in turn. To give to such a child toys too elaborately wrought is to do him a real injury. Creative imagination is all too rare, and it should be fostered, not stifled, in every child.

The best kinds of toys, then, are those that suggest rather than fulfil, and those with which the child can really do something. Mechanical toys, which supply their own energy, should never be allowed to take the place of those into which the child must infuse a part of his own life and energy.

**The Home-Made Toy.** It follows from this that the toys which are made by the children themselves are the ideal ones. Expensive materials and tools are neither necessary nor desirable; an array of boxes of various sizes, spools, paper, string and cigar-box wood, together with a hammer, scissors and small nails and a bottle of glue will keep the ingenious child happy indefinitely. The doll's house may be furnished throughout with furniture made of pasteboard or heavy paper (see Kindergarten, pages 3242 and 3243), and the doll inmates, with all their changes of costume, can be fashioned easily according to suggestions made on pages 1831 to 1834. Clothespin men afford much amusement, and spools and match boxes provide material for all sorts of carts and wagons. The child who is "handy" and has a fair degree of ingenuity can manage to make use of many of the odds and ends which are thrown into the wastebasket.

The making of such toys furnishes an excellent introduction to the manual training work of the schools; and any boy who has taken manual training should find no difficulty in making, for the delight of his younger brothers and sisters, the wooden toys shown in the color plate herewith.

**History of Toys.** Just because toys are imitative and reflect the fashions and the interests of the day in which they are made, they are of real interest to students. The jointed wooden dolls and the crocodile with movable jaws found in the tombs of ancient Egypt make that far-away time and country seem much closer and more human, while the tops and hoops with which the Roman children played prove that child nature and child desires have changed little through the centuries. Doubtless the Roman boys played at chariot racing with improvised chariots, and the boys of the

# CHILDREN'S TOYS

Middle Ages probably fashioned for themselves standards ornamented with the Cross of the Crusaders.

There is one curious thing about those toys which have been preserved from the Middle Ages, and that is the infinite care and fine workmanship which are everywhere visible. There were no special toy makers in those days, and the goldsmith who made the elaborate ornaments for the cathedral not infrequently condescended to carve miniature soldiers or horses for the children of his wealthy patrons.

Every advance in science left its mark on the toy making of the day. When the balloon ascensions of the Montgolfier brothers were holding the attention of the world (see page 559), children everywhere were amusing themselves with toy balloons and were climbing to high places in order to launch toy parachutes. When automobiles became practicable and common, the toy machine followed close upon the real one, and in these later days there is scarcely a boy with any hint of ingenuity who has not busied himself with make-believe flying machines.

The making of toys has become a vast industry in recent years. For a long time, however, the manufacture of these child necessities was practically confined to Europe, the French making the costly and beautiful toys, the Germans the simpler and less artistic ones. Until the last years of the nineteenth century there was not a doll factory in the United States. The change had begun before the outbreak of the War of the Nations; a larger and larger proportion of the toys of American and Canadian children was being made in America. During that struggle importations of foreign toys almost ceased, and it became evident that the hundreds of American factories could turn out toys which were more attractive than the imported ones, and which were almost as cheap. Winchendon, Mass., is the greatest toy center in the United States, nearly every enterprise in the town being a toy factory. A.MC C.

Consult Adams' *Toy-Making at Home;* Rich's *When Mother Lets Us Make Toys;* Bailey's *Boys' Make-at-Home Things;* Jackson's *Toys of Other Days.*

**Related Subjects.** The reader may refer to the following articles in these volumes:

| | |
|---|---|
| Child | Kindergarten |
| Dolls, Paper | Play |
| Games and Plays | |

**TRACERY,** *trays'er i,* a term in architecture which refers to the intersecting rib work, bands and fillets in the upper part of Gothic windows, used to support the glass and for ornamentation. It is also applied to the interlaced work of a vault, walls or panels in Gothic churches and cathedrals. The art of tracery was first practiced in Gothic architecture in France, in the early part of the thirteenth century. It

FAN TRACERY
Example from the vault of Henry VII's chapel, Westminster Abbey.

was then used in window ornamentation, but has gradually extended to almost every part of church buildings.

The chief forms of tracery include the *geometric,* with bars or ribs all about the same distance from one another; the *flowing,* with free, curving lines; and the *flamboyant,* with flowing and swaying lines. The latter is an elaboration of the flowing style.

**Fan Tracery,** a form of ornamentation used on the surface of vaults (see VAULT). It is an elaborate, carved tracery which spreads out like the folds of a fan.

**TRACHEA,** *tra'ke a,* the scientific name for the principal air tube in the body, which is commonly spoken of as the *windpipe.* The trachea starts at the larynx, and can be felt in the front part of the neck as a section of hard ridges. It ends with the bronchial tubes, and through these structures communicates with the lungs (see illustration, page 3536). In an adult the windpipe is about three-fourths of an inch in diameter. It consists of a supporting layer of connective and muscular tissue, lined with mucous membrane, and its walls are kept from collapsing by incomplete rings of hard cartilage, which enclose the tube at the front and on the sides. The back of the tube rests against the oesophagus. On the surface of the mucous membrane there is a layer of cells, each of which terminates in a tuft of tiny threads. These delicate hairs, or *cilia,* are constantly

moving back and forth, and their purpose is to force dust particles and bits of mucus away from the lungs. C.B.B.

**Related Subjects.** In connection with this subject the reader should consult the following articles:

| | |
|---|---|
| Breath and Breathing | Larynx |
| Nose | Lungs |

**TRACHYTE,** *tra'kite,* a volcanic rock consisting chiefly of sanidine and feldspar. The name is derived from a Greek word meaning *rough,* and was applied because the presence of small cavities in the rocks makes the broken surfaces of specimens very irregular. In color trachyte ranges from pale gray to black; it has conspicuous crystals of feldspar scattered through it, giving it the appearance of porphyry (which see). The Black Hills in South Dakota, and sections in Wyoming, Colorado and Montana are the only regions in the United States where trachyte is found. It occurs in great abundance along the River Rhine and in Italy, France and the Azores.

**TRACTION ENGINE,** *trak'shun en'jin,* or **TRACTOR,** *trak'tor,* a name applied to a variety of self-propelling machines used in farm operations, for hauling loads and in road building. In such work it is rapidly supplanting the horse. There are many types in use. A standard pattern of steam tractor has a high-pressure engine and a horizontal boiler mounted on four wheels, the rear ones being equipped with broad, roughened tires that can travel over any kind of ground without slipping. The forward wheels, which are smaller than the others, are connected with a steering mechanism. The engine has an adjustable gear by which it can be attached to the rear wheels when the operator wishes to have the machine propelled; when the power is used for operating machinery the gear is detached.

Since the internal-combustion engine (see Gas Engine) has been made commercially practicable, many types of gasoline-power tractors have come into use, especially on small farms. Among these is the steel "mule" tractor, which is attached to plows and other implements. Some of these tractors are designed to use kerosene or other low-grade fuel after the motor has been started by gasoline. A late substitute for the horse is a one-wheel tractor which can be turned in a complete circle. The power plant, driver's seat and driving apparatus are mounted with the wheel and turn with it. One of its special advantages is that it can be managed easily in places where there is little room in which to move. The self-propelled, combined harvester and tractor is equipped with an internal-combustion engine which furnishes power both for propulsion and for cutting, thrashing and binding the grain.

The average price of tractors which use gasoline for motive power has decreased from about $1,000 to less than $500. The greatest manufacturer of automobiles in the world announced in 1916 that he had perfected a tractor for use on farms which could be sold for $200, but manufacturing necessities due to the entrance of America into the War of the Nations postponed its manufacture.

**TRADE-MARK,** a mark, sign, device or picture printed or stamped on manufactured goods for purposes of identification. The trade-mark is an outgrowth of a desire on the part of manufacturers to place goods for which they have won a reputation beyond the range of imitation, and to afford the public ready means of identifying goods with which they have become accustomed and which they have found satisfactory. In olden times a producer sought to identify himself with the quality of his work; for example, the shoemaker naturally wished to be known as "Tom Jones, the shoemaker." In a small community nobody ever thought of shoes without thinking of Tom Jones, or of Tom Jones without thinking of the good shoes he made. So long as business was personal, Jones's products needed no other identification. But modern business is not personal; the user of an article seldom knows who made it. Thus there arose a need for a name or a mark which the public could be taught to associate with a certain article.

Although trade-marks have been in existence for centuries, their present importance and legal position are a product of modern industrial conditions. As recently as the middle of the eighteenth century the English courts declared that a trade-mark did not exist in the sense in which the term is now used; if one man could use a mark, anybody could use it. In 1803 the English courts first attempted to prevent fraudulent use of another person's trade-mark. The first United States statute on the subject was passed in 1870, but the statute now in force was passed in 1906.

**What Constitutes a Good Trade-Mark.** Although a trade-mark may consist of merely a signature, a picture, a sentence or symbol, the selection of what would be considered a good trade-mark is by no means easy. Trade-marks can now be protected by law, but words in

**THE TRACTOR.**

Above: Turning two furrows of greensward at once. Below: Disking and harrowing.

everyday use cannot be called trade-marks and cannot be registered as such. Such expressions as "Superior Hats," "Best Quality Leather," "Finest Teas," cannot be registered as trade-marks. A coined word, suggesting the goods or their qualities, a striking design also bearing some definite relation to the articles to be marked, or some unique phrase is usually sought, and so widely advertised do many of these trade-marks become that the sight of them is sufficient at once to suggest the articles they stand for.

**Value of Trade-Marks.** It would be quite impossible to state the value that attaches to certain trade-marks owned by producers who have built up splendid reputations for goods backed by solid worth. Were it proper to mention some articles of general merchandise the following illustrations would be more forceful. A competitor of a stove-polish maker whose trade-mark is known in every home offered a million dollars solely for that trade-mark. He did not want his rival's factory nor his selling organization—simply the name was required—but the successful company placed a higher value upon the device, and would not sell. The soap business presents at least three instances of immensely valuable trade-marks, one probably so highly valued that no offer could secure it. Everybody knows the photographic apparatus for which a new word was coined; the name of a certain biscuit is better known than any other. A glance at the advertising of any magazine will establish the fact of a trade-mark's value.

Such advantage does not come to the manufacturer easily; he works years to establish his supremacy and spends vast sums of money in advertising to impress the name of his wares upon the public mind; it is but proper that his efforts should be protected from imitators.

**Term and Cost.** In the United States a person who wishes to secure a trade-mark makes application to the Patent Office, submitting the design he wishes to use, accompanying it with a fee of ten dollars. If his design is unlike any other and the words employed come within the requirements of the law, the permit is issued; if used continuously, it is valid for twenty years, and is subject to renewal for a like term. In 1917 there were over 6,200 trade-marks effective in the United States.

The British trade-mark laws are similar. Registration of trade-marks has only been permitted since 1875, but during the first part of the nineteenth century owners were protected by the common-law practice. Registration in England now grants sole ownership for a period of fourteen years, and for another period of fourteen years if the owner desires renewal.

In the Dominion of Canada there are two kinds of trade-marks which may be registered; these are termed *general* and *specific*. A general trade-mark is one used in connection with the business or occupation as a whole; such a trade-mark may be registered on payment of a fee of thirty dollars, and once registered it endures forever. A specific trade-mark is used in connection with a particular article or class of articles; the registration fee is twenty-five dollars, and the period of protection is twenty-five years, subject to renewal for periods of twenty-five years each as long as the owner desires.

**International Regulations.** By the Convention of Paris of 1883, the nations which were represented agreed that citizens or subjects of each should enjoy, in all the nations, all the present or future privileges as regards trade names and trade-marks in their own country. By the Convention of Madrid, in 1891, a trade-mark registered in any one country is thereby registered in all the countries which agreed to the Convention. Great Britain did not sign this Convention, but it has special agreements with nearly every country in the world. Thus a citizen of any country, if he complies with a few simple regulations, secures protection in most nations. See INVENTION. E.D.F.

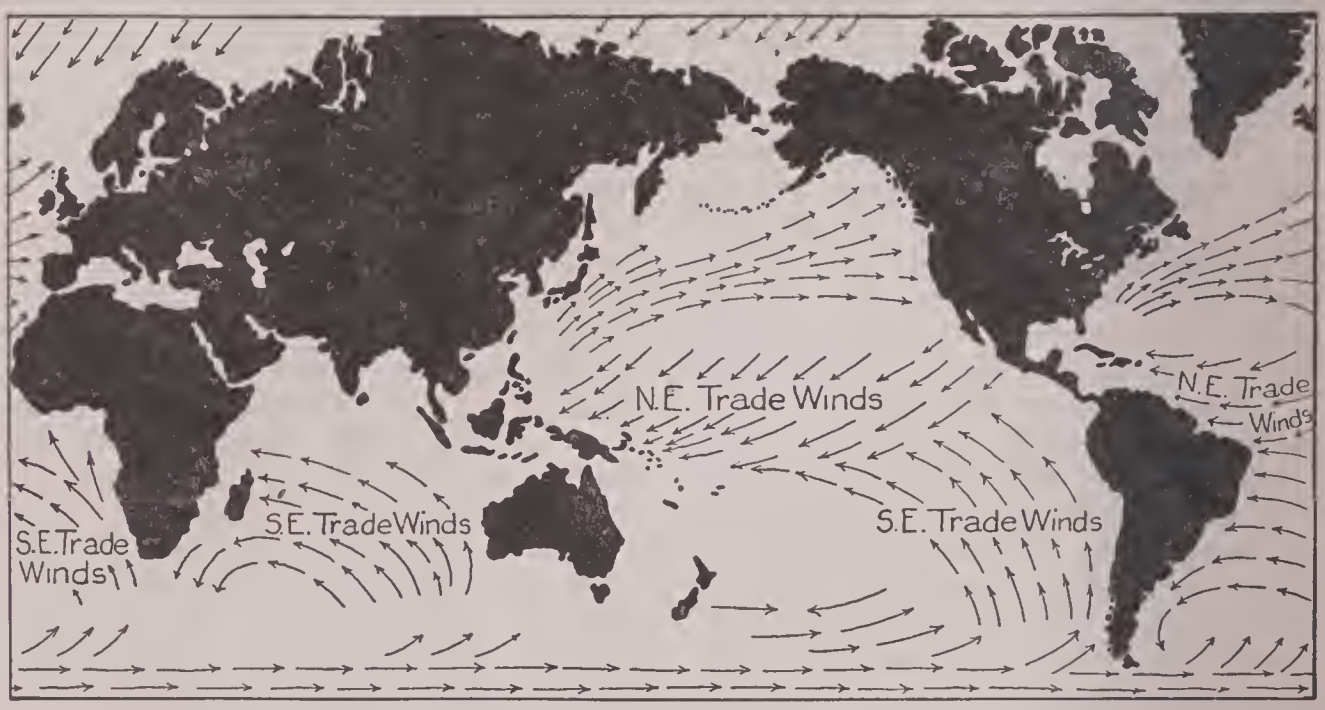
Consult Underwood's *How to Select Trade-Marks;* Rogers' *Good Will, Trade-Marks and Unfair Trading.*

**TRADE UNION.** See LABOR ORGANIZATIONS.

**TRADE WINDS,** those winds that blow regularly from about the twenty-eighth parallels of north and south latitude toward a low-pressure belt around the equator. They blow from the northeast in the northern hemisphere and from the southeast in the southern hemisphere. The trades blow very steadily and in a uniform course over the oceans, and in the days of sailing ships navigators greatly depended upon them. It was their importance to ocean commerce that gave them the name of *trade* winds. Their course over land areas is more irregular, because of variations in temperature, influence of mountain barriers and various local disturbances.

These winds are a part of the great system of planetary winds caused by differences in temperature between the equatorial and polar regions. The great heat of the equatorial re-

gion causes the air in the torrid zone to become rarer and lighter, and consequently there is an upward current into the higher atmosphere. The surface currents from cooler regions north and south, which flow into the equatorial belt to take the place of the ascending currents of warm air, form the trade winds. The fact that they blow obliquely instead of directly north and south is due to the rotation of the earth on its axis. This movement turns them from a straight course and makes them easterly winds. The belt between the two sets of trade winds is a region of calms, in which sailing vessels in former days sometimes drifted for weeks. The trade-wind zone itself shifts north and south with the seasons, reaching its northern limit in September and its southern limit in March.




LOCATION AND DIRECTIONS OF THE TRADE WINDS

On land areas the trades have considerable effect on rainfall. When they blow over lowlands they take up moisture present in the atmosphere and create barren regions, as in the case of the Great Sahara and the Central Australian deserts. When they blow against mountain ranges they are forced upward, and the air on rising is cooled. This causes the moisture to be condensed and rain to fall. The northeast trades, for example, cause the heavy rainfall on the eastern slopes of the Andes and of the Mexican and Central American highlands.

See WIND, for diagram of the circulatory systems of the world, and for list of other winds with which the trades may be compared in their cause and effect.

**TRAFALGAR,** *traf al gahr'* (in England, *tra fal'gahr*), a low and sandy cape on the southwest coast of Spain at the entrance to the Strait of Gibraltar. It was off this cape on October 21, 1845, that the famous battle was fought in which Lord Nelson lost his life (see page 4114). Although outnumbered by the combined French and Spanish fleets under Villeneuve and Gravina, the superior skill and confidence of the British secured a decisive victory, the French and Spanish losing nineteen out of twenty-four ships. It was on this occasion that Nelson signaled to his fleet, "England expects every man this day to do his duty." The battle, although a brilliant victory, ended in gloom, for Nelson was mortally wounded in the hour of his greatest triumph.

Trafalgar since Nelson's time has been the name of one of the most important squares in London. On the north side of the square is the National Gallery, on the east the Strand and Saint Martin's Church, on the south Whitehall, the Horse Guards and the War Office, to the west is the Haymarket, with His Majesty's Theater and Waterloo Place. In the square, guarded by Landseer's lions of Britain, rises the monument to Nelson, the national naval hero.

**TRAGACANTH,** *trag'a kanth,* a gummy substance yielded by the stems of various thorny shrubs found in Asia Minor, Persia and Syria. These shrubs belong to the *Astragalus* genus of the pea family. The gum exudes through fissures or cuts in the bark, and is usually marketed in the form of thin flakes. It is of a dull white or yellowish color, translucent and

hornlike in texture. Tragacanth is used as a soothing remedy for sore throat, and is also employed to impart firmness to lozenges and pills.

**TRAGEDY,** *traj'e di,* a form of the drama which calls for a serious theme, dignified treatment and usually a disastrous ending. The word *tragedy* means *goat songs,* and was applied to the chants used by the men clothed in goatskins who represented the satyrs in the festivals of Bacchus. From the chants tragedy took its rise, and it was developed by the Greeks to a very high point. Aeschylus, Sophocles and Euripides had each a great part in this development. The Greeks took their tragedies as seriously as their religion; Aristotle gave as the reason for the existence of tragedy the "purification of the passions through the arousing of fear and pity."

One of the greatest names in the history of tragedy is that of Shakespeare, whose *Hamlet, Lear, Othello, Julius Caesar* and *Macbeth* have place among the few tragedies which are of very first rank; for since tragedy at its best is the highest form of poetry, it could scarcely be hoped that great examples should be numerous. Tragi-comedy is serious drama in which the outcome is happy, Schiller's *Wilhelm Tell* furnishing, perhaps, the best example of this form. Though the great tragedies of the past, presented by great actors, always find a ready hearing to-day, the large majority of theatergoers prefer lighter plays, and the comedies produced far outnumber the tragedies.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Aeschylus | Euripides |
| Drama | Sophocles |

**TRAG'OPAN,** a handsome bird of the pheasant family, found in the region of the Himalayas, dwelling in forests high up on the mountain slopes. It is noted for its bright, variegated plumage, and for two fleshy protuberances which hang behind the eyes. In the breeding season the male woos his mate by proudly erecting and distending these protuberances until they have the appearance of horns. The bird also possesses two large wattles which hang at the sides of the lower jaw, and these are likewise displayed conspicuously in the wooing antics. Tragopans feed on insects, leaves, fruits and seeds, and they nest in trees. The eggs, which are white, slightly speckled with dull lilac, resemble those of the common fowl. The birds are shy and are usually taken by snaring, being slowly driven toward nooses placed in openings near the point of two converging lines of hedge.

THE TRAGOPAN
About one-tenth actual size.

**TRAIL,** *trayl,* a town in the extreme southern part of British Columbia, about ten miles north of the United States boundary. It is on a branch of the Canadian Pacific Railway, and is forty-six miles southwest of Nelson. Rossland is thirteen miles west of Trail by railway. Both Trail and Rossland are in the heart of a rich mining district, Trail being noted chiefly for its great smelter, employing over 700 men in treating silver, lead, copper and other ores. Trail had the first lead-pipe factory in Canada. The town has a large trade with the surrounding district. Population in 1916, about 2,000.

**TRAILING ARBUTUS.** See Arbutus.

**TRAILL,** *trayl,* Catherine Parr (1802-1899), a Canadian novelist, known for her vivid sketches of pioneer life in Canada. Mrs. Traill was born in London, England. She was the third of the literary Strickland sisters, the two elder, Agnes (1796-1874) and Elizabeth (1794-1875), being known for their historical writings for children. In 1832, after her marriage to Lieutenant Thomas Traill, the youngest of the three emigrated with her husband to Canada and settled in the backwoods of Ontario. The pioneer's trials she portrayed in many novels and sketches, among which the following may be mentioned: *Backwoods of Canada; Canadian Crusoes; Rambles in the Canadian Forest; Pearls and Pebbles, or, Notes of an Old Naturalist;* and *Studies in Plant Life in Canada.*

**TRA'JAN** (Marcus Ulpius Traianus) (51-117), a Roman emperor, one of the most important military leaders in the history of the empire. He was born in Spain, of a Roman

family, was given a military education, and won distinction in the army in Spain, in Syria and in Germany. In 97 Nerva adopted him as his son and successor, and in the next year he became emperor. Citizens and soldiers were propitiated by gifts, and the praetorian guard was divided and scattered among the legions, that its power might be lessened. Trajan was extremely popular with his troops, even though over them he exercised the strictest control.

Much of his reign was spent away from Rome in campaigns on the frontiers of the empire. Dacia and Armenia were conquered and made provinces, and Syria, Mesopotamia, Arabia and Parthia, which had become almost independent, were again reduced to submission. In 106 Trajan celebrated at Rome a splendid triumph and instituted games which lasted for four months, during which 10,000 gladiators and 11,000 beasts are said to have perished in the arena. Although in the main a military ruler, Trajan spent much time and money beautifying Rome; he lessened taxes, corrected abuses in the laws and improved the administration of the provinces. While believing in religious toleration, he permitted a mild persecution of the Christians.

**Trajan's Arch.** In A. D. 114, in commemoration of the opening of a new road to Brundisium, Trajan caused a marble arch to be erected at Benevento, where it now stands, one of the best preserved monuments and one of the finest examples of the Roman arch. The archway is twenty-seven feet high, the whole structure of white marble being fifty feet in height, decorated with figures in relief illustrating the triumphs of Trajan over the Dacians.

ARCH OF TRAJAN

**Trajan's Column,** a beautiful column erected by the Senate and people of Rome in A. D. 114, in honor of Trajan, the victorious emperor. The pedestal is covered with figures illustrating the victories of the emperor. It is still standing, in a state of splendid preservation, among the ruins of Trajan's forum in Rome. The column itself is 100 feet high and was formerly surmounted by a colossal figure of Trajan, which was replaced in 1588 by a statue of Saint Peter. In the interior of the column is a spiral staircase leading to the summit. Although the ashes of the emperor are said to have been deposited beneath this column, no trace of such burial has been found. A.MC C.

**TRANCE,** *trans,* an abnormal state of consciousness in which powers are retained to guide speech and conduct but without normal responsibility and memory. The state occurs spontaneously and is induced in connection with the phenomena of hypnotism and spiritualism.

See HYPNOTISM, and list of related subjects given therewith.

**TRANSCENDENTALISM,** *tran sen den' tal iz'm,* a term applied to any philosophy which is based on a spiritual interpretation of the universe. The term is associated particularly with the idealistic philosophy of Immanuel Kant, a German scholar whose ideas were taken up and expounded in England by Carlyle and Coleridge. Later they inspired the movement in America known as *New England Transcendentalism.* Ralph Waldo Emerson was its most celebrated exponent, and others identified with it were W. E. Channing, Henry D. Thoreau, Margaret Fuller, Theodore Parker, Amos B. Alcott and George Ripley. The American Transcendentalists had no well-defined creed, but they were all idealists.

The basic principle in their philosophy was the supremacy of mind over matter and of the intuitions over tradition and established creeds. The truths of religion, they said, were revealed to the individual through his own consciousness. Even the manner of worship practiced in the Unitarian Church seemed too formal to Emerson, who withdrew from the ministry in that denomination early in his career. His followers in the movement were interested in social and political reform as well as in religion and philosophy. Women's rights, temperance, prison reform, abolition of slavery and vegetarianism were a few of the subjects they discussed. Their belief that a number of people could live happily together on a communistic

plan was tested in the establishment of Brook Farm, near West Roxbury, Mass. (see BROOK FARM). Their ideas found published expression in a journal called *The Dial,* of which Emerson was the editor, and which was circulated from 1840 to 1843.

**TRANSCONA,** *trans ko' nah,* a town in Manitoba, six miles east of Winnipeg. It is on the main line of the National Transcontinental and Canadian Pacific railways and on a branch of the Canadian Northern. It takes its name from the Transcontinental Railway, in whose shops there are about 1,200 employees. This is the largest establishment in the town. Transcona was founded in 1910, and was incorporated two years later, its population at that time being about 1,600. Population in 1916, about 3,357.

The War of the Nations was responsible for the establishment of a new industry, the manufacture of shells, in Transcona; about 500 men were thus employed in 1916. The town owns its water system, and receives electric light from Winnipeg. Transcona offers unusual facilities for manufacturers and seems destined to be a great industrial center.

**TRAN'SEPT,** a term in architecture applied to a section of the floor space in a cathedral of the cruciform plan. The floor in such an edifice has the general shape of a Latin cross, and the transept is the space corresponding to the arms of the cross (see diagram, page 4093, article NAVE). The arms are sometimes designated as the *north transept, south transept,* etc. See ARCHITECTURE.

**TRANSFORM'ER.** In carrying electricity from one point to another through wires, it is cheaper and in other ways more desirable to have a heavy voltage than a light one, but for actual work in lighting and in driving machinery only a low voltage is practical. By the use of a device called a *transformer* it is possible to generate a current of low voltage, increase it for transmission and decrease it again for service. The principle of the transformer is simple. Faraday, in 1831, discovered that if a current is sent in alternating directions through a wire it causes a second current in a near-by wire. Thus, if a hollow square, or core, of iron has the wires of one circuit wound around one side and those of another circuit around the other, a transformer is created. If an alternating current is sent through the first circuit it causes shifting lines of magnetic force, which induce in the other circuit a current flowing in the other direction. In general, if there are twice as many loops of wire in the first as in the second coil, the voltage of the current will be cut in half and its amperage doubled. In some transformers the core is outside of the coils.

A transformer is one form of *induction coil.* See the article on that subject, and those on ELECTRICITY; AMPERE; VOLT; MAGNET AND MAGNETISM.

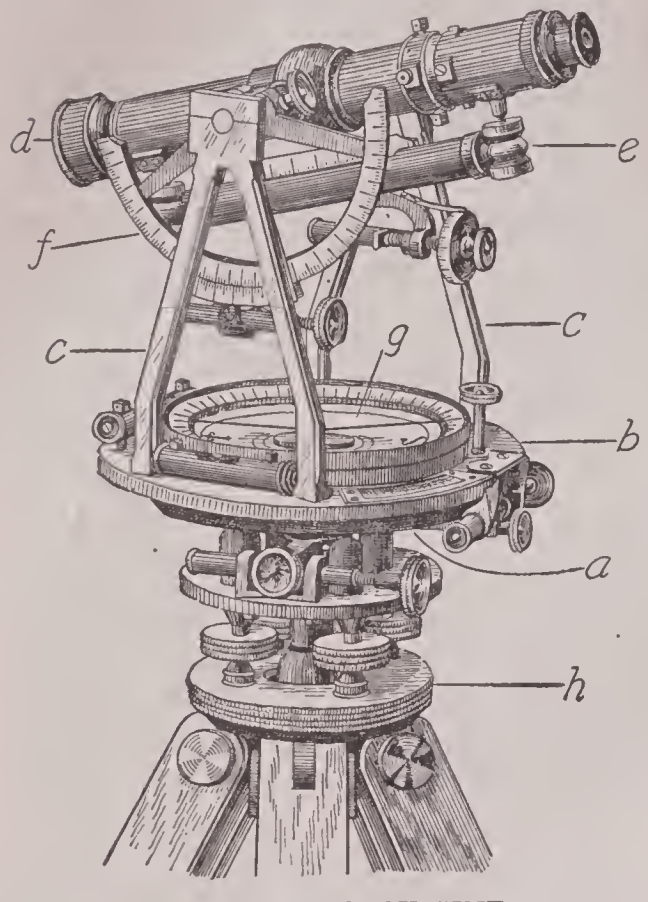
**TRAN'SIT,** the crossing of one heavenly body over the disk of a larger one, as seen from the earth. The term is usually restricted to the passage of inferior planets.

**Transit of Venus.** Of great importance are the transits of Venus, as they afford means of measuring the dimensions of the planetary system. At the time of transit Venus crosses the disk of the sun directly in line with the earth. The transits are rare, only four taking place in a period of 243 years. The next transit of Venus will occur June 8, 2004; others will follow in 2012 and 2117. Although important as means of measurement, astronomers now rely on what are considered more reliable methods than those afforded by the transit. See PARALLAX.

**Transit of Mercury.** Transits of Mercury occur more frequently than those of Venus, though they are not so important for astronomical study, as Mercury is much farther distant from the earth. In the twentieth century transits of Mercury will occur as follows: May 7, 1924; November 8, 1927; May 10, 1937; November 12, 1940; November 13, 1953; November 6, 1960; May 9, 1970; November 9, 1973; November 12, 1986; November 14, 1997.

**TRANSIT,** the instrument most generally used by surveyors and civil engineers for measuring angles, determining bearings and doing leveling. The chief parts of the transit are two circular plates, *a* and *b,* usually of brass or copper and mounted independently upon the same axis so that the upper plate will revolve upon the lower. Supports, *c c,* are attached to the upper plate to support the telescope *d,* which moves upon a horizontal axis. The level, *e,* is attached to the telescope, and a graduated verticle circle *f* is attached to the axis. Beneath the telescope is a magnetic needle, *g,* which moves over a dial graduated in degrees, minutes and seconds. The edge of the lower plate is also graduated, and the upper plate carries a pointer. Verniers are also attached to both the horizontal and vertical scales so that the slightest movements can be easily read. There are numerous other screws and lines for adjustment

of the instrument, but their description is not essential to an understanding of its workings. The entire apparatus is attached by a toggle




TRANSIT INSTRUMENT
The figure is explained in the text.

joint to a brass plate, *h,* which is fastened to the tripod.

**TRANSMIGRA'TION OF THE SOUL,** the belief that the soul, after the death of the body, passes into the bodies of lower animals or the bodies of human beings, for purification. Among the Brahmanic Hindus it has its foundation in the belief that the soul must do penance and be cleansed before its return to God, the source of all things. The Buddhists, another Hindu sect, believe that the soul must be free from all passions and desires or else pass through all the gradations of vegetable and animal life for thousands of years before it reaches Nirvana, or absolute loss of existence (see BRAHMANISM; BUDDHISM).

In ancient Egypt, where the belief took the form of *reincarnation,* it was closely connected with the system of animal worship. The Egyptians believed that the soul after the death of the body must have a tangible habitation, and that the souls of the gods dwelt in certain animals set apart as sacred. The soul of Osiris, for example, was believed to live in the body of a sacred bull. Transmigration of the soul was also advanced by the Greek philosophers Pythagoras and Plato, and Caesar tells us that the belief was current among the Gauls. A few minor Christian sects have at various times accepted the idea, but Christianity as a whole rejects the belief.

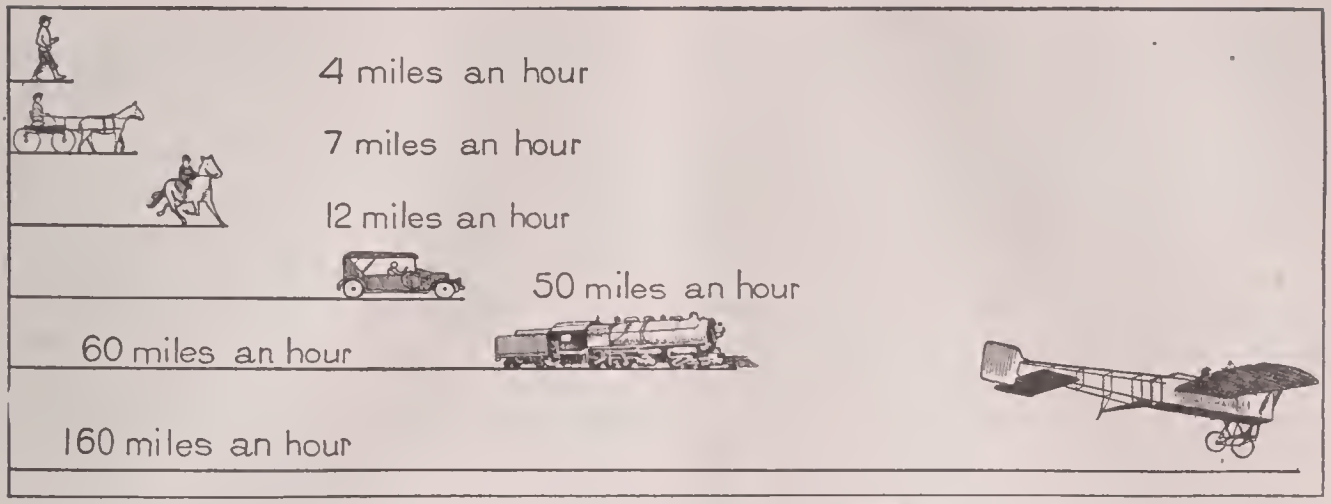
**TRANSPORTA'TION.** One-half of the inhabitants of the earth live on less than one-seventh of its surface. That the vast population of the earth may have food, clothing and shelter, the less populous regions must contribute a part of their products to those more densely populated. The necessity for this distribution of material has led to the development of the great transportation systems of modern times. Before he domesticated the horse, the ox and the ass, man carried his own burdens, and in some regions, like the interior of Africa, all goods are still transported on the backs of men. It was an easy matter to train domestic animals to carry loads, and after they had become accustomed to this, to hitch them to sledges.

The next step consisted in affixing wheels or trucks to the sledge and converting it into a cart. Carts could not be used without roads, and men began to improve the paths over which they traveled. Each new vehicle required better roads than its predecessors, and the improvement of roads followed closely upon the improvement of vehicles. The carriage road led to the railway, which, from small beginnings, has been developed into the great systems of the present time. Of still later development is the automobile, now manufactured in a wide variety of forms and used both for business and for pleasure.

Men probably rode upon logs in the water before they made the dugout, which, hollowed out of a log, was the forerunner of the rowboat (see illustration, page 1159). The sailboat followed the rowboat, and sailing vessels had developed into large ships before the steam engine was applied to navigation. The motor boat has followed the steamboat, and there is scarcely a lake or river within the bounds of civilization that does not have its motor boat. Among the modern water vehicles should be mentioned the submarine, which travels beneath the sea and on the surface.

Man's final conquest in transportation is the navigation of the air, in which extraordinary progress has been made since the beginning of the present century.

Closely allied with transportation are the various means of communication—the postal service, the telegraph, and the telephone. All




DEVELOPMENT OF THE MEANS OF COMMUNICATION

these have drawn the nations of the earth so near to each other that the most distant nations are neighbors.

Consult Dunbar's *History of Travel in America;* Talbot's *Steamship Conquest of the World.*

**Related Subjects.** In connection with this general discussion of transportation, the following articles in these volumes may be consulted:

Automobile
Bicycle
Boat
Cape-to-Cairo Railway
Caravan
Carriage
Common Carrier
Dixie Highway
Ferry
Flying Machine
Highway
Jinrikisha
Lincoln Highway
Locomotive
Monorail, Suspended
Motor Boat
Motorcycle
Ocean, subtitle *Ocean Routes*
Palanquin
Pavement
Pneumatic Tubes
Pontoon
Railroad
Railroads, Transcontinental
Roads and Streets
Sailboat and Sailing
Ship
Sledge
Submarine
Subway
Taxicab
Trans-Siberian Railway
Wagon
Warship

Much interesting information will also be found under the subhead *Transportation* in the articles on the various states and provinces. The illustration on page 4919 graphically shows the development of the locomotive.

**TRANS-SIBERIAN,** *si be'ri an,* **RAILWAY,** THE, one of the longest railroads in the world, a system connecting the cities of Petrograd and Moscow and the railroads of Europe with Vladivostok, the Siberian port on the Sea of Japan. Bisecting the plains of Siberia and Manchuria, it crosses 111 degrees of longitude and extends over one-sixth of the distance around the globe. The distance from Cheliabinsk, on the European frontier, to Vladivostok is 4,500 miles, and from Petrograd to Vladivostok, 5,481 miles. This railway furnishes the shortest and cheapest route between Europe and Eastern Asia. The journey from Vladivostok to Petrograd on this road can be made in a little over two weeks; by way of the Suez Canal and the Indian Ocean the journey from Petrograd to Peking requires forty-five days, and it takes thirty-five days to go by way of New York, San Francisco and the Pacific.

The building of the railroad marked the dawn of a new era in the development of Siberia. Local industries and foreign trade have been stimulated in the rich coal fields of the eastern section, and in the great live stock and agricultural regions of the central and western plains. Just before the War of the Nations, the railway was carrying 700,000 pioneers into Siberia each year, and in 1910 it transported 7,508,675 tons of freight and 1,869,183 passengers.

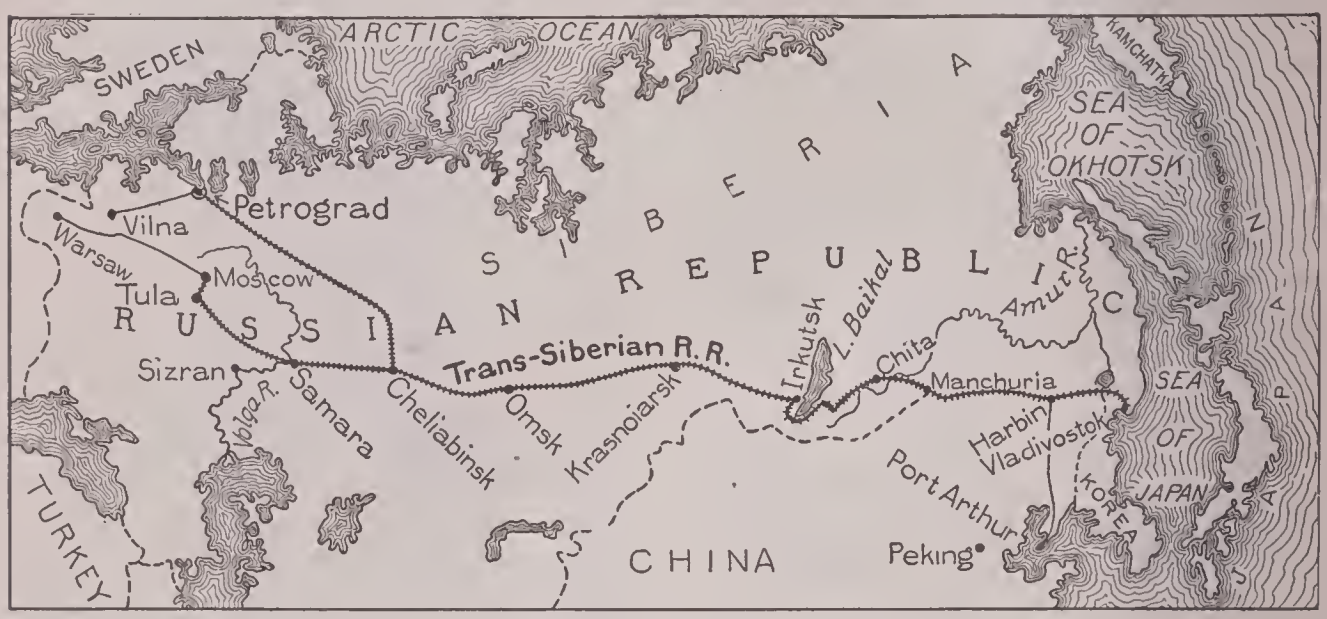
The construction of a transcontinental railway joining the cities of European Russia and the Asiatic ports was first planned in 1850, but owing to the vastness of the project and its great expense, the government delayed its construction. In 1891 M. Witte, the Russian Minister of Finance, succeeded in obtaining the imperial approval of the road, and work was immediately begun. The construction progressed with unparalleled rapidity; the strictly Siberian section, covering 3,300 miles, was completed by 1898, the rate of construction averaging two miles a working day. The cost of the entire road was more than $500,000,000, an amount far exceeding that spent on any other public work except the Panama Canal.

From Cheliabinsk the line extends across the western and central plains in a general easterly direction past the great city of Omsk, to Krasnoyarsk, where it bends to the southeast. Beyond Irkutsk it winds east and south around the southern end of Lake Baikal; bending northeast, it then pierces the lofty mountains,

and continues east to the Pacific slopes. From Khabarovsk it extends south to Vladivostok. As originally planned the section between Stretensk and Khabarovsk was to follow the Amur River, but the rough hills and steep grades made it necessary to substitute a line running farther to the south through Manchuria. This Manchurian section also has a branch extending south to Port Arthur, and connection is made at Mukden with the Southern Manchurian system, affording communication with Peking.

The building of the division around Lake Baikal and across the eastern mountains, known as the Trans-Baikal section, presented vast difficulties because of the steep slopes and apparently bottomless marshes. The line was opened to traffic before this section was completed, and for three years cars were transferred across the lake by ferry, or in winter on rails laid on the ice. Most of the line was originally single track, and though the roadbed was fairly substantial, light rails and inexpensive ties were used. It has been much improved, however, by enlarged sidings, extended sections of double track and reduced grades. Where double tracks have been laid it has been necessary to widen the roadbed and tunnels. Substantial culverts are built of masonry, stone or heavy timbers, and steel bridges span the larger streams; that bridging the Irtish River is almost four miles in length, and is considered one of the best railway bridges in the world.

Powerful locomotives burning wood, coal or oil are used, and passenger trains are well equipped and comfortable, although they do not possess the luxurious appointments of roads in other countries. The weekly "international train de luxe" is steam heated and electric lighted, and carries corridor trains, dining cars and first- and second-class sleepers, which are divided into staterooms containing two or four berths. This train was temporarily discontinued during the War of the Nations. The stations are located thirty-three miles apart and are of substantial and artistic design. A wooden blockhouse, the headquarters of the local police, flanks every station. The great station at Omsk, crowded with immigrants and travelers, in its busy activities resembles the railroad station of an American metropolis.



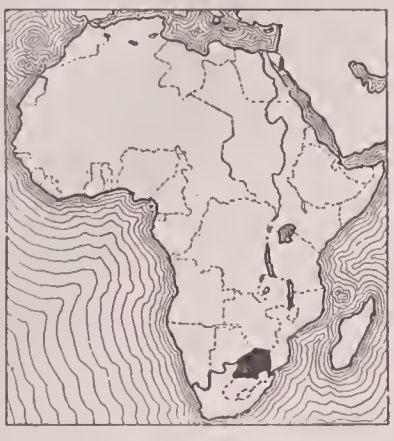

ROUTE OF THE TRANS-SIBERIAN RAILROAD

During the Russo-Japanese War, the Trans-Siberian Railway was one of Russia's most valuable assets and transported 1,000 troops a day to the front, as well as enormous quantities of arms and munitions. In the War of the Nations it was again of invaluable military service, although the enormous demands upon it seriously impaired its equipment. Although supplies were carried from the East to Russia by way of Archangel and the White Sea, the railroad furnished a quicker and safer route and transported quantities of munitions from the Pacific ports to Russia in Europe. The railway was the chief factor in consolidating Russia's Asiatic possessions and in extending its influence over that great domain. E.B.P.

**TRANSVAAL,** *trans vahl'*, THE, one of the richest mineral countries in the world, is a province of the British Union of South Africa. It forms a compact territory in the table-land of Southeastern Africa, about fifty miles from the Indian Ocean at Delagoa Bay. Having an area of 110,426 square miles, it is about as large as

the state of Nevada, or as large as Great Britain and Ireland combined. It is a little more than five times the size of Nova Scotia.

The province was settled by the Boers, the descendants of the early Dutch, French and German colonists of the Cape, but the white settlers constitute only a fourth of the population, which in 1911 numbered 1,686,212. The native inhabitants are negroids of the Bantu family, and though many tribes in the northern, eastern and extreme southwestern provinces still retain their aboriginal customs and tribal chieftains, a large number are in the service of the colony as laborers in the mines and on farms. Johannesburg, the largest city in the South African Union, and Pretoria, its seat of government, are both Transvaal cities and important centers of industry and trade.



LOCATION MAP

Transvaal occupies a relatively-small portion of the African continent, but no other political division is more important.

**The Land.** The Transvaal is for the most part a plateau country, with an average elevation of from 3,500 to 5,000 feet above sea level. A northern extension of the Drakensberg Mountains extends along the eastern part of the country and follows the southern boundary for a considerable distance. The highest summit of the range, the Mauchberg, has an altitude of 8,730 feet. Extending eastward from the mountains is a broad belt of lowland, which approaches a range of flat-topped hills—the Lebombo—on the frontier between the Transvaal and Portuguese East Africa. The interior of the plateau region is crossed from west to east as far as Johannesburg by a range of hills called *Witwatersrand,* which constitutes one of the richest gold fields in the world and forms the water parting between the rivers flowing into the Indian Ocean and those flowing into the Atlantic.

Farther north, separated from the hill region by a low bush (or low veldt) country, are the Waterberg and Zoutpansberg ranges, the latter being the northern termination of the Drakensberg. The land south of the Witwatersrand and west of the Drakensberg, which is called the high veldt, is a rolling, treeless country, with occasional flat-topped or pointed knobs, called *kopjes,* varying the landscape. In this region there are numerous fresh-water springs and several shallow lakes with no outlet, called *pans.* The largest of the pans, Lake Chrissie, is only five miles long. The waters of these lakes are generally brackish. The low veldt, a desolate region covered with scrub, is for the most part level country, though it is occasionally broken by ridges and kopjes. In the far north the veldt slopes rapidly to the lowlands along the Limpopo River.

Two great fissures are cut in the plateau by the Limpopo and the Vaal rivers. The former flows along the northern and northwestern borders of the province, describing a great semicircle 1,000 miles in length. After leaving the province it flows southwest through Portuguese East Africa to the Indian Ocean. With its tributaries it drains an area of 95,000 square miles in the Transvaal. The Vaal, rising in the west slope of the Drakensberg, flows southwest to the Orange River and thence to the Atlantic. It forms most of the southern boundary of the province, which is thus well named, "across the Vaal." The Olifants, the chief tributary of the Limpopo, drains the region between the high veldt and the northern ranges.

In the interior uplands the climate is healthful, but along the low, damp banks of the Limpopo there is a malaria and fever belt infested with the tsetse fly, and its jungles and thickets are inhabited only by the elephant, lion and other wild animals of the African forests. The rainfall ranges from forty inches in the east to twelve inches in the western plains, and is heaviest during the hot summer season, lasting from October until April. The winter months between April and September are cool and invigorating.

**Industries.** In respect to agriculture the Transvaal is chiefly a stock-raising country, and the land devoted to grazing covers 30,000,000 acres. Sheep and goats are raised in largest numbers, and other stock includes horses, cattle, mules, swine and ostriches. There are about 2,000,000 acres under cultivation, and the principal crops are maize and tobacco. Potatoes, barley and oats are also cultivated with profit, but many agricultural products have to be imported.

The most important industry in the province is mining. The hills and mountains of the Transvaal are richer in minerals than any other region on the African continent, and are un-

rivaled anywhere else in their great variety of riches. The chief products are gold and diamonds, in the output of which the province yields to no other region in the world. The production of gold in 1915 was a third of the world's supply, and almost the entire product was mined in the Witwatersrand, near Johannesburg. The diamonds are obtained chiefly in the vicinity of Pretoria, and the annual Transvaal product, exceeding $6,000,000 in value, is about two-fifths of the total output of the Union of South Africa. Other important mineral products include coal, tin, copper and silver.

Dr. Gorgas, noted for his work in the improvement of the living conditions among the laborers in the Panama Canal Zone, was invited to inspect conditions among the gold miners in the "Rand," where the death rate has long been very high, and as a result of his investigation conditions are being much improved. The province has not made great progress in manufacturing, but there are in operation grain mills, breweries, brick and tile works, pottery works, soap and candle factories, iron and brass foundries, wagon works and various other manufacturing plants.

**Transportation and Commerce.** There are over 2,360 miles of railroad in the province; Pretoria and Johannesburg are connected with the chief towns of the Orange Free State, through which passes the trunk line of the Cape-to-Cairo Railway, and a railroad extends to the seaport at Delagoa Bay. The railroads were extended to German Southwest Africa, to aid in the invasion of the German protectorate during the War of the Nations, and it is now possible to travel without change from Johannesburg to Walfish Bay on the Atlantic coast. Telegraph lines connect the chief cities with those of the Cape, through which they have communication with the rest of the world. The province exports mining products, wool, tobacco and live stock, and imports manufactured products, foodstuffs, clothing and other necessities. During the War of the Nations stringent regulations in regard to exporting were enforced.

**Government and History.** The executive head of the provincial government is an administrator, appointed by the Governor-General of the Union of South Africa for a term of five years. He is assisted by an executive council, or cabinet, of four members, and presides over the meetings of the provincial legislative council, which consists of thirty-six members elected for three years. This council enacts laws relative to all local matters of finance, agriculture, improvements and elementary education. Higher education is controlled by the Union Parliament. The province sends eight senators and forty-five representatives to the Union Parliament.

The history of the Transvaal has its beginning in the "Great Trek," or general emigration of Boer settlers from Cape Colony. Thousands of these dissatisfied settlers crossed the Vaal in 1848, and in 1852 succeeded in establishing the political independence of the region. It was first called the Transvaal, but in 1858 became known as the South African Republic. Trouble with the natives, whom they refused to give fair treatment, and boundary disputes with the English and Portuguese colonies on the east and southwest led the Boers in 1877 to appeal to the British authorities for assistance, and the Transvaal was annexed to the British domain. The Boers revolted in 1880 and 1881. The British government restored self-government to the republic, restricting the control of external affairs to the British resident, and in 1884 recognized the South African Republic as a state.

The discovery of diamonds in 1863 and the opening of the gold mines in the Witwatersrand in 1884 brought large numbers of English immigrants into the colony. The Boers, fearing they would be outnumbered and would lose control of the government, greatly restricted the rights of the English-speaking settlers. The difficulties between these two groups culminated in the South African War, which was begun by the Boers in October, 1899. As a result of the defeat of the Boers, the republic was annexed to the British Empire as Transvaal Colony. In 1910 it entered the Union of South Africa under its present name.

In 1913 and 1914 serious strikes occurred in the gold districts and Johannesburg. To quell the disturbance, martial law was declared, and the strike leaders were seized and deported without trial. Certain economic reforms followed, including the passage of the Workmen's Compensation and Wage Protection acts.

The War of the Nations caused a general Boer rebellion throughout the Union, but it was suppressed by the defeat and imprisonment of the leaders. The sinking of the *Lusitania* in the spring of 1915 aroused an outburst of anti-German feeling, and was followed by serious riots in the city of Johannesburg. The Transvaal took an active part in the successful campaign against German Southwest Africa and

supplied troops to the force of 25,000 men raised by the Union in 1915 for the invasion of German East Africa and to the overseas expedition to aid the allies in Europe. E.B.P.

Consult Fisher's *The Transvaal and the Boers;* Tangye's *In New South Africa.*

**Related Subjects.** The following articles in these volumes will give further information on the subject of the Transvaal:

| | |
|---|---|
| Bantu | Pretoria |
| Boer | South African War |
| Diamond | Tsetse Fly |
| Gold | Union of South Africa |
| Johannesburg | |

**TRAP'DOOR SPI'DER,** the name applied to an interesting group of spiders found in warm regions. The name refers to a hinged door of silk and earth which the spider constructs to cover the round entrance to its underground tunnel. This door, made of alternate layers of silk and mud, fits the entrance perfectly, and is hinged at one side to the silk lining of the burrow. In loosening and carrying away earth and in spinning silk to make the door and lining, the spider works long and laboriously. Tunnels almost an inch across and a foot long are dug by a species found in the southwestern part of the United States. When in danger the spider flees into the tunnel and clings to the door with its jaws. The burrow is also a place of refuge for the mother spider when rearing her young. As a measure of precaution the entrance is concealed by a covering of earth or gravel. These spiders are large, hairy creatures, belonging to the tarantula family. They feed principally on ants and other wingless insects, and sometimes on caterpillars and earthworms.

TRAPDOOR SPIDER AND ITS NEST

**TRAPEZIUM,** *tra peez'i um,* a plane figure having four sides, none of which are parallel. See QUADRILATERAL, subhead *Trapezoid and Trapezium.*

**TRAPPISTS,** *trap'ists,* a branch of the Cistercian Order of monks, famed for the austerity of its rules. These were introduced in 1664 by the abbot of La Trappe, a Cistercian monastery founded in Normandy, France, in 1140. The Order is classed among the most rigorous of the Roman Catholic Church. At the time of the expulsions in France in 1903 there were fifty-eight Trappist monasteries in that country. At the present time, the Trappist monasteries are scattered throughout Europe, Asia, Africa, the United States, Canada and China.

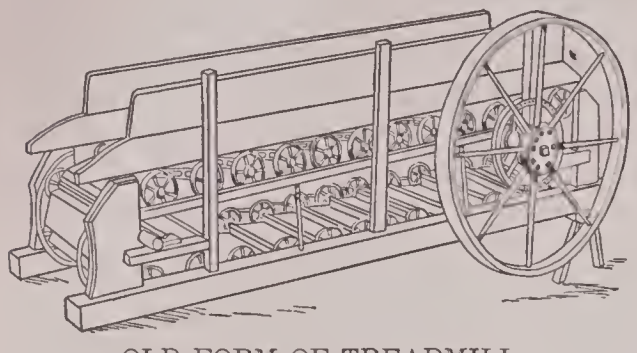
A member of the Trappist Order gives most of his time to prayer and meditation; the fast rule is severe, and meat, wine and beer are absolutely forbidden. Strict silence is observed, except in the case of necessity or in the entertainment of guests, but hospitality is recommended. The bed consists of a board and a pillow of straw, and at night the garments are not removed. Several hours daily are devoted to hard labor, and in heathen countries the work of the Order is directed to the civilization and education of the natives.

**TRAVERSE,** *trav'ers,* **CITY,** MICH., the county seat of Grand Traverse County, is situated at the mouth of the Boardman River, at the southern end of Grand Traverse Bay, an inlet of Lake Michigan. It is in the upper western part of the lower peninsula, 145 miles north of Grand Rapids and sixty miles northeast of Manistee, and is on the Grand Rapids & Indiana, the Manistee & Northeastern, the Pere Marquette and the Traverse City, Leelanau & Manistee railroads. In 1910 the population was 12,115; this had increased to 13,816 in 1916 (Federal estimate). The area of the city exceeds five square miles. Traverse City is attractively situated, and is a popular summer resort. Prominent features are the Federal building, Carnegie Library, the county normal, the Northern Michigan Insane Asylum and the city parks. The industrial establishments include manufactories of oval wooden dishes, cornstarch, agricultural implements and fur coats. Traverse City was settled about 1850 and was chartered as a city in 1895. The commission form of government was adopted in 1913. R.H.E.

**TRAVERTINE,** *trav'ur tin,* a white or straw-colored porous stone formed from the lime deposits of streams, lakes and springs. It is a soft and spongy rock, easily worked when first quarried, but hardening afterwards. Large deposits are found in many parts of Italy. It is the material that was used for the outside walls of numerous buildings of ancient and modern Rome, including Saint Peter's and the Colosseum. Among the ancient Romans it was known

as the stone of Tibur, because it was formed by the waters of the Anio at Tibur, an ancient Latin town, now Tivoli.

**TREADMILL,** *tred'mil,* a machine formerly in common use in British prisons, where it was operated by convicts sentenced to hard labor. It consisted of a revolving cylinder, or wheel, having steps around the circumference and a



OLD FORM OF TREADMILL

handrail above. When the criminals were placed on the steps the weight of the men started the wheel to revolving. To keep their balance they were forced to grasp the rail and tread the mill so long as the machine was in motion. The power could be used for grinding corn or for other similar purposes. The operation of the machine was considered a form of cruelty by enlightened prison authorities, and such use of the treadmill has long been abandoned.

The name, however, is still applied to a machine in which use is made of the weight of dogs or horses on a series of treads, sometimes arranged on an endless band. The mechanism is attached by belting to machinery, which is operated by the movement of the animals on the treads.

The word is used in literature in a figurative sense to signify ceaseless toil.

**TREASON,** *tre'z'n,* in a broad sense, is treachery, breach of faith or the betrayal of any trust. In its modern application it is a serious breach of allegiance to a government, committed by a citizen or subject, or by one under its protection; as such, it is the greatest crime known to the law. While murder is a grave offense, its results affect few people; treason, if its object be accomplished, may destroy the peace of a nation and work harm to all of its citizens. Possibly as comprehensive a definition of treason as can be given is found in the United States Constitution, Art. III, Sec. 3, and it is the only crime defined in that document. With the change of a few words it will apply to any country:

> Treason against the United States shall consist only in levying war against them, or in adhering to their enemies, giving them aid and comfort.

The present law of treason, both in England and in the United States, is based upon the Treason Act of England, passed in 1351, during the reign of Edward III, and this Act follows the principle of the old Roman Law of 48 B.C.

The possibility of committing treason is not limited to citizens or subjects of a country. An alien within its boundaries owes temporary allegiance to the government which shelters him, and he is bound to observe all the laws which control its citizens; the alien who gives aid or comfort to that country's enemies is guilty of treason, and against such a charge his own country cannot protect him. To incur punishment for treason there must be conviction of the crime through the courts, or, in time of war, when the writ of habeas corpus is suspended, by trial by court-martial, according to the common-law procedure.

In cases of treason against the United States, Congress has power to decide what the punishment shall be, the only provision of the Constitution being that it "shall not work corruption of blood, or forfeiture, except during the life of the person attainted." Death or life imprisonment is the usual penalty of the law.

The most notable instance of treason against the government of the United States is that of Aaron Burr. The Dreyfus case in France is the best-known instance of a charge of treason in recent times, but Captain Dreyfus proved to all the world his innocence. C.H.H.

Consult Marshall's *Treatise on the Law of Crimes.*

**Related Subjects.** The following articles in these volumes will serve to make clear the references in the above discussion of treason:

| | |
|---|---|
| Alien | Crime |
| Burr, Aaron | Dreyfus, Alfred |
| Court-Martial | |

**TREASURE-TROVE,** *trezh'ure trohv,* the name applied to hidden gold, coin or precious objects which have been recovered from the earth. The finder of hidden treasure, according to an old Roman law, was entitled to it when it was found upon his land, but if found upon the land of another, the treasure was divided equally between the finder and the owner of the land. In England concealed treasure belongs to the Crown, that is, to the king, but this law is not rigidly enforced; unless the discovered object is of historical value to the national museums, the finder is allowed to keep the treasure. In the United States the term is

seldom used. Objects of any kind belong to the true owner, and the laws uphold his claims; however, if he cannot be located articles are given to the finder.

**TREASURY,** *trezh'u ri,* **DEPART'MENT,** the executive department of the United States government which has control of the nation's financial affairs. The Treasury Department collects all taxes levied by Congress, including customs duties and internal revenue fees, and it also disburses all moneys collected. It has direct management of the minting of coins, as well as the printing of paper money and postage and other stamps. It protects the people from counterfeiters, and maintains a fleet of small, armed vessels to prevent smuggling and violation of quarantine laws. The construction and maintenance of all United States government buildings throughout the country are part of its work, and the auditing and general control of the financial accounts of the other executive departments. The merchant marine, the lighthouse and life-saving system and coast survey are all managed by the Treasury Department. With the exception of its duties as financial agent for the government, perhaps the department's chief responsibility is the supervision of the national banks.

These varied duties require a complex organization of more than 5,000 people. The head of the department is the Secretary of the Treasury, who is appointed by the President, with the approval of the Senate. The Secretary receives a salary of $12,000 a year, and is next to the Secretary of State in the line of succession to the Presidency. He is aided by three assistant secretaries, whose salaries are $5,000 a year. Many of the most famous Americans have held this important position, including Alexander Hamilton, Albert Gallatin, Alexander J. Dallas, William H. Crawford, Roger B. Taney, Salmon P. Chase, William P. Fessenden, Hugh McCulloch and John Sherman. The details of management are divided among a number of officials and bureaus, the most important of which are listed below:

The *Comptroller of the Currency* is usually considered the most important of the subordinate officials. The *Comptroller of the Treasury* ($6,000 a year) has general supervision over the auditors, and he also countersigns warrants (orders to pay) and other documents; no money can leave the United States Treasury until he gives his approval. Questions about appropriations are referred to him, and his decision as to what the appropriation law means is final. The six *auditors* are assigned respectively to the Treasury, War, Navy, Interior, Postoffice and the State and other departments. They examine and approve all accounts for their departments. The *Treasurer of the United States* ($8,000 a year) signs all the paper money issued by the government, and is the official directly responsible for the care and disbursement of all money belonging to the United States. The *Register* ($4,000 a year) signs all United States bonds and, with the Treasurer of the United States, all paper money issued by the national government. Originally the signatures of the register and the treasurer were written on paper money, but they are now printed in facsimile.

The *Commissioner of Internal Revenue* ($5,000 a year) enforces the internal revenue laws and collects all fees, including income taxes. There is a collector of internal revenue for each district into which the country is divided. For the collection of customs duties there are collectors in each district, all responsible to the bureau at Washington. The *Secret Service* branch of the department tries to prevent smuggling, counterfeiting, making whisky in secret ("moonshining") and other violations of internal revenue laws, and members of the service invariably are assigned to guard the President when he appears in public. The *Director of the Mint* ($5,000 a year) has charge of the coinage at the various mints, and the *Solicitor of the Treasury* is the legal advisor of the department. The bureau of printing and engraving, established in 1874, prepares the designs and prints postage and revenue stamps, government bonds, treasury drafts and paper currency. It is under the charge of a director, who receives $6,000 per annum. W.F.Z.

**Related Subjects.** The following articles in these volumes will explain the references in the above discussion of the Treasury Department and will give further information:

Assaying, subhead *Assay Office*
Banks and Banking, subhead *Banking in the United States*
Coinage, subhead *United States*
Counterfeiting
Customs Duties
Internal Revenue
Mint
Revenue-Cutter Service
Secret Service
Smuggling
Tax and Taxes

**TREATY,** *tre'ti,* a formal agreement, usually, but not necessarily, in writing, between two or more governments or rulers of independent states, corresponding, in a general way, to contracts between private parties. Only sovereign states can make treaties, and the nego-

tiation of a treaty is a mutual recognition of independence and sovereignty. A *concordat,* an agreement to which the Pope is a party, is not a treaty, nor is a *convention* between a sovereign state and an individual. An agreement between two kings on a private matter is not a treaty. Unlike a private contract, a treaty is not void because it is made under duress, that is, if one of the parties uses force. The cession of a province, after the enemy has taken it by force of arms, is incontestable, except again by force of arms. Also, unlike a private contract, a treaty does not go into effect until it is *ratified;* for example, if the United States ambassador negotiates a treaty with Great Britain, the treaty does not become effective until it has been approved by the United States Senate and by the British king.

**Kinds of Treaties.** Treaties may be divided into several classes, according to their purposes. The following divisions are arbitrary, and a treaty may frequently include clauses under several classes:

(1) *Political,* such as treaties of peace concluding a war, treaties of defensive or offensive alliance, agreements for cessions of territory, or for arbitration of disputes. Agreements for the exchange of prisoners, for truces, or the surrender of an army are wrongly called treaties; but an agreement ending a war is rightly a treaty. In this connection reference is often made to the *status quo,* a Latin phrase which literally means the *state in which.* Thus, if a treaty is said to leave things in *status quo,* the expression means that things are left as they were or in the *state in which* they had been.

(2) *Commercial,* including agreements referring to customs tariffs, navigation, fisheries and consular service.

(3) *Confederations,* such as the Zollverein, the Latin monetary union, and the International Postal Union.

(4) Agreements relating to the extradition of criminals.

(5) Civil justice, relating to the protection of trade-marks, copyrights and patents in foreign countries, and the rights of alien residents of a country.

**Negotiations.** In monarchies the treaty-making power is usually vested in the Crown, which may conduct negotiations through an envoy specially appointed or through the ordinary diplomatic representatives (see DIPLOMACY). In Germany, however, the approval of Parliament is necessary if the treaty deals with a subject included under its legislative powers, and in some other monarchies the approval of the lawmaking department is necessary if the treaty involves an expenditure of money.

In Great Britain neither house of Parliament has any power over treaties. Canada has won for itself the right to negotiate commercial treaties, but in political matters it is bound by the British treaties; commercial agreements are made by the Governor-General and his Privy Council and must be ratified by the Dominion Parliament. In republics the chief executive usually possesses the power to make treaties. In France the approval of both chambers of the National Assembly is necessary if the treaty involves the appropriation of money or in any way affects commercial relations.

In the United States the Constitution (Art. II, Sec. 2) grants to the President the "power, by and with the advice and consent of the Senate, to make treaties, provided two-thirds of the Senators present concur." The separate states are forbidden to enter into treaty agreements with foreign countries, or even with each other. The actual negotiations are in the hands of the Department of State, sometimes through special envoys, but more often through the ambassadors or ministers abroad. In practice the Senate has almost never been asked for "advice;" its share in the making of treaties is confined to the "consent," which is not always forthcoming, in which case the treaty fails.

Occasionally when the administration has been unable to command a two-thirds majority in the Senate, it has been able to secure the passage of a joint resolution, which requires only a majority of one. Thus, in 1845, Texas was admitted to the Union by joint resolution because it was impossible to secure the necessary majority in the Senate to ratify a treaty of annexation. Such a resolution, though not a treaty, in some cases may have the effect of one. The House of Representatives must consent to treaties which require legislation to put them into operation; such would be a treaty involving naturalization of immigrants, or commercial reciprocity, or any appropriation of government funds.

*Language Used.* Until the eighteenth century almost all treaties were written in Latin, which was the official or diplomatic language of Europe. Treaties even between states having a common language were usually in that language. In recent times French is almost always employed in making treaties, but it has also become customary to prepare translations in the languages of the treaty-making nations.

**Enforcement of Treaties.** It was formerly the practice of all nations to give hostages for

the performance of treaty obligations. The ancient Egyptians, the Hebrews, the Greeks and Romans followed this custom, which has been abandoned in modern times. The last example of this practice occurred in 1748, when two British peers were sent to France as hostages to insure the return of Cape Breton Island (Nova Scotia) to France. The hostage was practically a prisoner of war; if the treaty was not carried out he was punished, even to death. Since the eighteenth century the fulfillment of a treaty rests on the good faith of the nations who are a party to it, although it must be admitted that a powerful army or navy has sometimes been a threat to secure treaty rights. A nation injured by the failure of another nation to carry out a treaty has to this time had no recourse except in war. When, in 1914, the War of the Nations engulfed Europe, there was much discussion in official circles to the effect that a treaty is only "a scrap of paper." If such a thought dominates those who control the destinies of nations, and other powers remain quiet when treaty rights are violated, then a treaty is only binding in "political fair weather," and all nations must be ready to fight to uphold their rights. The world is moving towards a condition which will demand that all strong nations unite to force respect for treaty obligations by establishing international courts.

**Termination.** A treaty may be terminated in various ways. It may be *abrogated* (literally "called off") by mutual agreement, as was done, for example, in the case of the Clayton-Bulwer Treaty between the United States and Great Britain; or it may contain a clause giving either party the right to cancel it after due notice. If one of the parties disregards its provisions, the other may *denounce* it and refuse to be bound by it. If the conditions become physically impossible of fulfillment, the treaty is void. If we suppose, for example, that the straits of the Dardanelles by treaty are open to the ships of all nations on equal terms, the treaty is of no account if the Dardanelles become unnavigable. In case of war most treaties are merely *suspended,* or temporarily not in effect, but commercial treaties are void and must be renewed after the war.

**Ecclesiastical Treaties.** These are not treaties between ecclesiastical authorities, but treaties entered into by sovereign states and bearing upon the right of citizens or subjects of one state to the exercises of their religion within the boundaries of another. Among the Western nations, where freedom of worship prevails, no difficulties exist; a man may practice his religion as freely in a foreign land as in his own. But the question has arisen frequently in connection with missionary enterprises—indeed, missionary work cannot be carried on successfully in any pagan country which refuses to make ecclesiastical treaties. In China, in Japan and in various other countries Christian missionaries are allowed to teach the principles of Christianity, if they do so peaceably; in some countries, on the other hand, foreign residents are permitted to practice their religion unmolested, but are forbidden to indulge in any propaganda. W.F.Z.

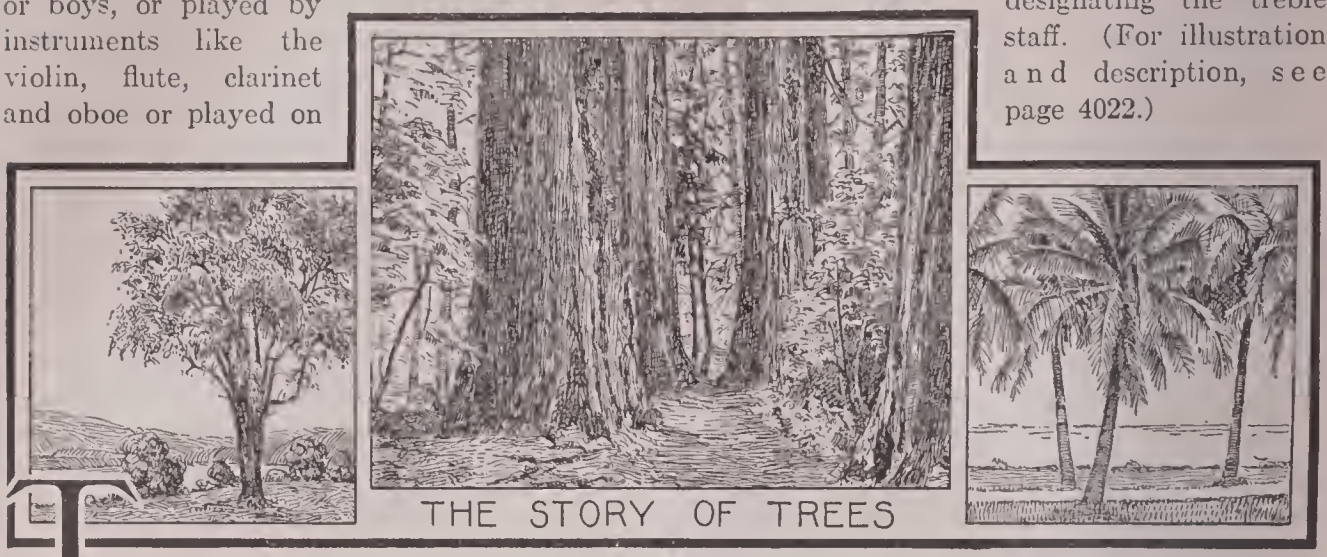
Consult Crandall's *Treaties: Their Making and Enforcement;* Burnham's *Struggles of the Nations, or, The Principal Battles, Sieges and Treaties of the World.*

**TREB'IZOND,** a seaport of the new Armenia, on the southeastern shore of the Black Sea, 570 miles east of Constantinople (see economic map of Asia, following page 416). It occupies the site of a Greek colony founded seven centuries before Christ, and in 400 B.C., when Xenophon's "ten thousand" reached the Black Sea at this point, they found there a flourishing city. Before the era of railroads Trebizond was a prosperous center of the transit trade between Persia and Europe, and in one period of its history it had a population of 150,000. Its commercial importance, however, declined with the completion of a railway line between the Black and the Caspian seas with branches to the south, for its enormous caravan trade was thereby diverted.

During the War of the Nations it came into prominence as an objective point of the allies. The fleets of the Russians bombarded it on several occasions, and early in 1916 it was captured by Russia. In 1918 the city was returned to the Turks, but was lost to them when peace was signed.

The city is beautifully situated on a rocky table-land skirted by two valleys extending to the sea. (The name *Trebizond* is derived from the Greek word for *table.*) On the summit of the plain an ancient castle rises, and the city is still encircled by walls erected by the Byzantine emperors. Trebizond is typically Oriental, with numerous mosques and Greek churches, and its dwelling houses are nearly all surrounded by gardens. The population of 55,000 is made up of Mohammedans and Greek and Armenian Christians, the first group being considerably the larger and occupying the space within the walls. Without are the Christian quarters.

**TREBLE,** *treb'l,* the highest of the parts in harmonized music, such as are sung by women or boys, or played by instruments like the violin, flute, clarinet and oboe or played on the higher keys of the piano or organ. *Treble clef* is the term applied to the character used in designating the treble staff. (For illustration and description, see page 4022.)




**TREE.** "The groves were God's first temples," and in the presence of the trees one finds peace, quietude and inspiration. Botanically a tree is a perennial plant with a single woody stem or trunk not less than twenty-five or thirty feet high. It differs from other woody plants chiefly in size. Certain trees called *dwarfs* do not reach this standard of height, but their form and size are due largely to pruning. Many full-grown trees are from two to ten times twenty-five feet in height, and the tallest of them extend upward from 300 to 400 feet.

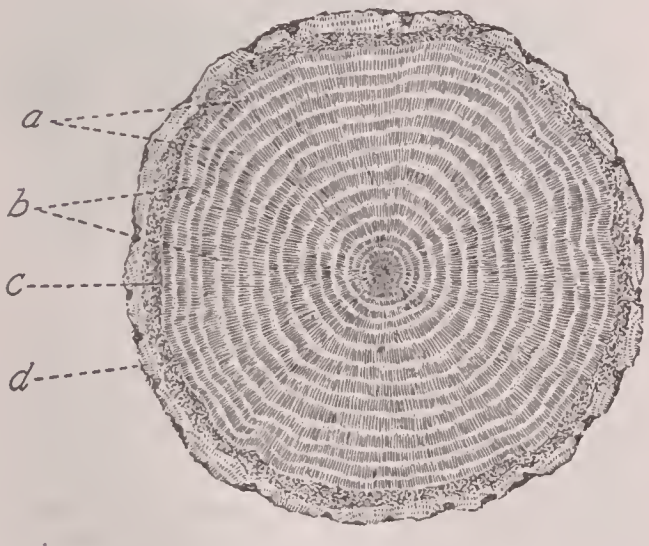
**Parts of a Tree.** The principal parts of a tree are the root, the trunk, or bole, and the crown. The roots extend downward deep into the earth. They supply the tree with water and the plant food taken from the soil, and hold it firmly in position. The root systems of trees vary with the size and shape of the crown. A tree having a large spreading crown, such as the elm, for instance, has a larger root system than one whose crown is cone-shaped, like that of the pine or fir. The root system of a tree with a large crown is subjected to an enormous strain in case of a strong wind, and it must be large enough to keep the tree from being blown down.

FIG. 1
Tree with undivided bole.

Trees are divided into two general classes, according to the plan of the bole. In those of the first class the bole extends the entire length of the tree without division. Examples are the pine, fir and hemlock, among the evergreens; and the beech, among deciduous trees, that is, those that shed their leaves in the fall. This plan is shown in Fig. 1. In trees of the other plan, the bole divides into branches, forming a large crown, as seen in the elm, oak and maple. This is shown in Fig. 2. The shape of the crown depends upon the plan of the bole. Trees of the first plan are nearly always conical when allowed to grow unhindered, but in pine forests the trees are so close together that the lower branches die, leaving a long, naked trunk which bears a few branches at the top. In cool climates the elms furnish the best examples of the branching bole because the crown is usually symmetrical and graceful.

FIG. 2
Tree with divided bole.

**How to Study Trees.** One need not be a scientist to know something about trees, and their study affords much pleasure. In the first place, begin with the trees in your locality. Select one tree and study it through the year. The time for beginning this study is not especially important provided you continue your observations to the same date in the following year, but your observations should be directed to the feature that is the most prominent at the time. If the tree is in blossom when it first interests you, study the blossoms; if the leaves have fully developed, study them. Should the observations begin in the winter, study the bole, branches and bark. The flowers and fruits are of special interest. Do the flowers appear before the leaves? Are they large and showy, or small and apparently insignificant? How does the tree scatter its seeds? Are the seeds enclosed in a bur? Are the seeds of value to man? If so, for what are they used? Study the wood. Provided you can do so without injuring the tree, procure specimens. Can you tell the different kinds of lumber by the grain, as pine from spruce, and oak from beech and maple? Small pieces of boards that will enable you to make this study can easily be obtained at carpenter shops.




AGE OF A TREE

Cross section of a tree showing rings of annual growth:

(*a*) Rings of annual growth
(*b*) Boundaries between rings
(*c*) Interior layer of bark
(*d*) Hard plates of dead bark

**The Age of Trees.** Each year the hardwood or the softwood tree records its age by adding a layer of new wood to its bole and branches. When the bole of one of these trees is cut across and the surface made smooth, these rings can be counted, so that it is easier for us to determine the age of a tree than that of any other thing that has a long life. Many trees are living witnesses of a distant past and have recorded in their boles events that took place about them. The average life of nearly all classes of trees is more than a hundred years, and many live several centuries. Though the tree grows as long as it lives, it grows more slowly after reaching maturity. The oak, for example, reaches maturity in 120 to 200 years, and after that the annual layers of wood are very thin. The oak is said to live a thousand years. As Dryden expresses it:

> Three centuries he grows and three he stays
> Supreme in state; and in three more decays.

The Charter Oak must have stood several centuries when in 1687 the charter of Connecticut was concealed within it. This tree was blown over in 1856. The Washington Elm was an old tree when Washington in 1775 took command of the American army under its protecting shade, and it still stands. Many of the great trees in the region of the Rocky and Cascade mountains are from 800 to 1,000 years old. In 1900 there was felled a giant California redwood that began its existence 271 B.C. A scientific study of the trunk of this tree revealed many interesting facts in its history. It was 1,763 years old when Columbus discovered the New World, and some of the "big trees" are older than this (see SEQUOIA).

> "Of our swift passage through the scenery
> Of life and death, more durable than we,
> What landmark so congenial as a tree,
> Repeating its green legend every spring,
> And with a yearly ring
> Recording the fair seasons as they flee,
> Type of our brief but still renewed mortality?"

**Planting Trees.** The following suggestions will be found helpful to those who have not had experience in planting trees:

1. See that the soil is suited to the tree. Trees often die because they are taken from a locality having a different soil from that to which they are transplanted.

2. Make the hole large enough to spread the roots out in their natural position. Make it so deep that the tree will be about three inches lower in the ground than it was in its former position.

3. Have the soil finely pulverized and moist, but not wet. Work the soil around the rootlets with the hand so that all the rootlets will come in contact with it.

4. After filling the hole drive three stakes firmly into the ground about a foot from the tree. Wind a piece of cloth around the tree on a level with the top of the stakes, and brace the tree firmly by winding a strong cord around it and tying this to each stake.

5. Cut off the ends of the branches and the trunk to prevent growth the first year.

6. Keep the soil moist throughout the season, but do not use so much water as to make it muddy, since this will "drown the roots."

Consult Rogers' *The Tree Book;* Mills's *The Story of a Thousand-Year Pine.*

**Related Subjects.** The following general articles and descriptions of trees will be of interest in connection with this discussion of trees:

Acacia
Ailanthus
Alder
Arbor Vitae
Ash
Aspen
Banyan
Basswood
Bay Tree
Beech
Birch
Bitternut
Black Gum
Bottle-Tree
Box Tree
Buckeye
Buckthorn
Cabbage Palm
Cacao
Carob
Catalpa
Cedar
Chestnut
Cocoa, subhead *The Tree*
Cone-bearing Trees
Cottonwood
Cypress
Date and the Date Palm
Deciduous Trees
Doom Palm
Elder
Elm
Eucalyptus
Evergreen
Fringe Tree
Fruit (with list)
Hemlock
Hickory
Horse-Chestnut
Ironwood
Ivory Palm
Judas Tree
Laburnum
Lace-Bark Tree
Larch
Laurel
Leaves
Locust
Lumber
Magnolia
Mango
Mangrove
Maple
Mountain Ash
Nettle Tree
Nut (with list)
Oak
Olive
Osage Orange
Palm
Palmetto
Palmyra Palm
Pine
Plane Tree
Poplar
Red Cedar
Roots
Sago
Seeds
Sequoia
Sorrel Tree
Spruce
Stems
Sycamore
Tallow Tree
Tamarind
Teak
Tulip Tree
Upas
Willow
Yew

**TREE,** Sir Herbert Beerbohm (1853-1917), an English actor and theatrical manager, widely known for his productions of Shakespearean plays. In most of these he himself played leading rôles. He was born in London, and in that city made his first appearance on the stage in Boucicault's *Grimaldi,* in 1877. For several years he attracted no special attention, but in 1824 suddenly gained international fame by his impersonation of the Rev. Robert Spalding in *The Private Secretary.* His accurate imitation of the typical English clergyman became the talk of London theatergoers, and his services were at once in demand by numerous managers, not only in England but in America.

During the next three years he created the leading rôles in Hugh Conway's *Called Back* and Sir Charles Young's *Jim, the Penman.* He then became his own manager, took charge of the Comedy Theater in London in 1887, and immediately made a great success of Tristram's drama, *The Red Lamp.* Within a few months he assumed management of the famous Haymarket Theater in London, and for many years played to crowded houses. Tree took charge of Her Majesty's Theater in London in 1897, opening it with *The Seats of the Mighty.* He produced new plays with a versatility which astonished dramatic students, and which, after the death of Sir Henry Irving in 1905, secured for him the rank of the greatest living British actor. He was created a knight by King Edward VII in 1909. In 1916 he made a successful tour of the United States, appearing in *Henry VIII* and *The Merchant of Venice,* and in a splendid revival of Du Maurier's *Trilby.*

**TREE FROG,** or Tree Toad, a group of small tree-dwelling frogs. Their toes are claw shaped and have knobs on the tips which exude a sticky fluid to help them cling to smooth bark. Most of these frogs have the power to

A TREE FROG

change color through a range of grayish-browns and greens, according to the color of the surface they are on. Like all other frogs they are entirely harmless, and extremely useful as destroyers of insects. Their breeding habits are various and interesting. In Brazil there is a species in which the female deposits the eggs in a round mud nest, constructed on the bottom of a pond. The females of other South American species have pouches in which the eggs are placed. Some species place the eggs on trees above pools, and the tadpoles, when hatched, slip down into the water.

**TRE'FOIL,** meaning *three leaved,* is the name applied generally to various plants having compound leaves in three parts, like the clover. It is specifically applied to a genus belonging to the same family as the bean and pea,

many species of which are found in the temperate parts of the northern hemisphere.

*Bird's-foot* trefoil, so called because it bears clusters of pods somewhat resembling a crow's foot, has prostrate stems, yellow flowers with a honeylike scent and leaves divided into three leaflets. The plant is sometimes identified with the Irish shamrock. It grows commonly in European meadows and in the United States, especially in the South. Among other species are the *winged pea,* which southern Europeans use in making salads; and *marsh bird's-foot,* commonly seen in damp meadow land. In art, *trefoil* is the name of a three-lobed decorative figure.

**TRENT,** next to the Thames and the Severn, the most important river of England. It rises on the northwestern border of Staffordshire, flows southeast to the borders of Derbyshire, then northeasterly through Derby, Nottingham and Lincoln, until it meets the Ouse. These two streams unite to form the Humber. The Trent is 170 miles long and is navigable for barges for 120 miles.

Through the Nottingham woods, watered by the Trent, Robin Hood used to roam and hunt, and on its banks is Stoke-Upon-Trent, the center of a group of pottery towns which Arnold Bennett, in his novels of the Five Towns, has made famous.

**TRENT,** Council of. After the development of the Protestant Reformation, Roman Catholic authorities felt the need of a great council for the restatement of the fundamental doctrines of the Church. Such a council was called at Trent, a city of the Austrian Tyrol, in December, 1545, by Pope Paul III. Wars and religious disturbances interrupted the sittings, and the work of the council was not completed until 1563, when its decrees were confirmed by Pope Pius IV. The council reaffirmed the doctrine of granting indulgences, but corrected some of the defects in regard to practice, and decided several other important questions. The decrees of the Council of Trent are at the present time regarded as authoritative statements of Roman Catholic creed and practice.

**TRENT AFFAIR,** The, an episode of the War of Secession which is of historic importance chiefly because it involved the old question of the right of search. In the fall of 1861 the Confederate government commissioned John Slidell and James M. Mason to go to France and England to secure the aid of those countries for the Southern cause. The British mail steamer *Trent* took them aboard at Havana. On the eighth of November the *Trent* was halted by the United States ship *San Jacinto,* under command of Captain Charles Wilkes, and the commissioners were taken prisoner and carried to Fort Warren, in Boston Harbor.

Though the people of the North approved of this act, it was recognized as a breach of international law by President Lincoln and Secretary of State Seward. The President said, "We fought Great Britain in 1812 for insisting on the right to do precisely what Captain Wilkes has done." Accordingly, in response to England's demand that the commissioners be given up, the American government ordered them released and made a formal apology. In the course of the diplomatic correspondence Secretary Seward congratulated England on having become an advocate of the principle to which America had long ago given assent. The commissioners proceeded to London, but accomplished nothing, as the British government refused to recognize the Confederate states as a belligerent nation.

**Related Subjects.** The reader may consult in this connection the following articles:

Mason and Slidell — War of Secession
Search, Right of — Wilkes, Charles

**TRENT CANAL,** also called the Trent Valley Canal, a Canadian waterway, in Southern Ontario. It is destined to become a through route between Lake Ontario and Lake Huron, but at present is efficient only for local use. It is really a series of water stretches—lakes, rivers and canals—extending from Trenton, Ont., at the mouth of the Trent River (on the Bay of Quinté, Lake Ontario), to Honey Harbor, on Georgian Bay, about ten miles north of the town of Midland. From Trenton the course ascends the Trent River, then passes through Rice Lake and a chain of smaller lakes to Lake Balsam, the summit; thence it extends through Lake Simcoe and Lake Couchiching and the Severn River to Georgian Bay. Construction was begun by the British government in 1837, but completion has been postponed from time to time.

The most noteworthy improvements on the Trent Canal are the two great hydraulic lift locks, one at Peterborough, with a lift of sixty-five feet, and one at Kirkfield, with a lift of fifty feet. The Peterborough lock, which is shown in the illustration on page 1111, is the largest of its kind in the world. There are in all twenty-five locks on the Trent Canal, all except one being east of the summit. The annual freight tonnage varies from 60,000 to

70,000, and the cost of construction up to 1916 was about $14,000,000.

**TRENTE-ET-QUARANTE,** *trahNt ay kahr ahNt'*, or **TRENTE-UN.** See Rouge-et-Noir.

**TREN'TON,** a town in Hastings County, Ontario. It is the southern terminus of the Trent Canal, and is situated at the mouth of the Trent River, near the west end of the Bay of Quinté. It is served by the Canadian Pacific, Canadian Northern and Grand Trunk railways. By rail it is 101 miles east of Toronto, and 107 miles west of Brockville. Near Trenton are iron mines and limestone quarries. Although not a large town, Trenton is a manufacturing center of some importance, its principal products being canned goods, clothing, buttons and paper. Population in 1911, 3,988; in 1916, estimated, 4,800.

**TRENTON,** Battle of, an American victory of the Revolutionary War, of importance because it renewed the courage of the patriot forces and seriously disarranged the plans of the British. The battle was fought on the morning of December 26, 1776, about a month after Washington had begun his retreat across New Jersey. On December 8 he crossed the Delaware River, with the forces of Cornwallis in close pursuit. The British general then led his army to Princeton, stationing a force of Hessians at Trenton. On Christmas night Washington recrossed the Delaware, in which blocks of ice were floating, and marched to the enemy's camp at Trenton. The Hessians, who were sleeping off the effects of a night's carousal, were completely surprised, and after a brief skirmish the Americans captured nearly a thousand prisoners.

The events leading up to this battle and those immediately following are told in detail in the article Revolutionary War in America, page 4987. See, also, Princeton, Battle of.

**TRENTON,** N. J., the capital of the state, the county seat of Mercer County, and a foremost center for the manufacture of pottery. It is situated on the Delaware and Rariton Canal and on the Delaware River, at the western border of New Jersey. Philadelphia is thirty-three miles southwest, and New York is fifty-nine miles northeast. Transportation is provided by the Philadelphia & Reading and the Pennsylvania railroads, and by an extensive system of interurban lines, which extend to New York, Philadelphia, Newark and other cities and towns in New Jersey and Eastern Pennsylvania. Many nationalities are now represented among the people of Trenton, but for a long time Quaker influence prevailed. The population increased from 96,815 in 1910 to 111,593 in 1916 (Federal estimate).

**General Description.** Trenton has many landmarks and buildings of historical interest. In the center of the city is Battle Monument, a shaft 150 feet high, surmounted by a colossal statue of Washington; it marks the spot where Washington stationed his guns on the battle field of Trenton. The *Swamp Angel*, the large gun used by the Federal troops in the swamps during the siege of Charleston, S. C., in 1862, is mounted on a granite pedestal in Perry Street. Trenton's most attractive park, Cadwalader (100 acres), with its zoo, is on the outskirts of the city, and Riverside Park extends three miles along the river front.

Among other points of interest are Bow Hill, a quaint old home in the vicinity, for a time the residence of Joseph Bonaparte, the elder brother of Napoleon; and the old stone barracks, erected in 1758. Trenton was the home of John A. Roebling, the engineer who designed Suspension Bridge and the Brooklyn Bridge. Noteworthy buildings are the state capitol, constructed of granite (see panel illustration, heading the article New Jersey), the Federal building, city hall, courthouse, state prison, armory, arsenal, asylum for insane, reform school for girls, and a state library and museum. Trenton has also a public library, a beautiful white marble building, Saint Francis College, the state normal school, a school for deaf mutes and a number of private schools.

**Manufactures.** The city is located at the head of tidewater navigation, and its fine shipping facilities by water and by rail, its nearness to the coal fields of Pennsylvania and its proximity to the great markets of Philadelphia and New York combine to make it a great industrial city. All grades of pottery, from fine china to the commonest variety of porcelain, are made in the forty potteries of Trenton. Only the clay used for "saggers," the cases used in firing pottery, is found in the locality, the material used in the manufacture of the fine wares coming from elsewhere. White granite sanitary earthenware, tiles, drain pipes and porcelain bathtubs are also made. The wire mills and iron works here have an extensive output of wire cloth, netting, structural iron, anvils, cables, chains, engines and machinery. Trenton is also an important center of the rubber industry, and there are factories producing linoleum, school and church furniture, watches, carriages, electric lamps and candy.

**History.** The site of Trenton was known as a post for trade between the Indians, Dutch and Swedish as early as 1664. In 1680, Mahlon Stacy, a Quaker colonist, made the first settlement by erecting a mill here, and the place became known as The Falls, on account of the rapids in the river. Stacy sold his plantation in 1714 to William Trent, chief justice of the colony, and in 1719 the present name was adopted. The settlement was incorporated as a borough in 1746. A provincial congress of New Jersey met here in 1775, and in December, 1776, Trenton was the scene of one of the greatest battles of the Revolutionary War, when General Washington crossed the Delaware River and took more than 1,000 prisoners (see TRENTON, BATTLE OF). In 1790 the place became the capital of the state, and in 1792 it was chartered as a city. South Trenton was annexed in 1850, Chambersburg and Middleham in 1888, and Wilbur in 1898. The city limits were further expanded in 1900 by including parts of the townships of Ewing and Hamilton. In 1911 the city adopted the commission form of government. H.D.C.

Consult Lee's *History of Trenton.*

**TRENTON SE'RIES,** an important rock system of the Ordovician Period in geology. It includes the Trenton limestone, Utica and Hudson shales and the Cincinnati shale in New York, Canada and Ohio. Rocks of this system occur in the Rocky Mountains and in the Mississippi Valley, where they contain valuable deposits of zinc and lead, especially in Iowa, Illinois and Wisconsin. The petroleum of the Lima, Ohio, oil fields is also in this formation, as are large quantities of natural gas. See ORDOVICIAN PERIOD.

**TRE'PANG,** the commercial name for various sea slugs widely used as a food by the Chinese. The slugs are found chiefly along coral reefs in the Eastern seas. They have soft, wormlike bodies, varying from a few inches to two feet in length. Their preparation for the market includes removal of the internal parts, boiling of the bodies, soaking them in fresh water and smoking and drying them in the sun. The product of these processes is a rubberlike substance, which is used to thicken soups. Though it is practically tasteless, trepang is nutritious. Macassar, a seaport of Celebes, in the Dutch West Indies, is the chief center of the industry. Large quantities from that city are exported yearly to China. There is also a local trepang industry in California, conducted or encouraged by the Chinese there.

**TREPHINING,** *tre fi'ning,* or **TREPANNING,** *tre pan'ing.* These terms are applied to the surgical operation of making a small perforation in the skull, and they also refer to the instruments used. A trepan is a small cylinder with sharp, cutting teeth on the edge. A trephine is an improved form of trepan. It has a handle placed horizontally, like that of a gimlet, and a sharp, steel center pin, which projects slightly below the edge of the cylinder. The pin, when fixed on the part of the bone to be opened, forms an axis for the rotating edge of the instrument. The pin is removed when a sufficiently deep groove has been cut for the instrument to work steadily. The trepan makes complete revolutions, but the trephine operates through semicircular movements to the right and left. Usually a small opening less than an inch in diameter is made, and if desired the perforation is then enlarged with other instruments. In many cases trephining is merely the preliminary step in operations which require the turning back of large sections of bone, as in the removal of tumor or abscess from the brain. The operation is frequently resorted to in cases of skull fracture and pressure on the brain. See SURGERY. C.B.B.

**TRES'PASS,** a legal term applied most commonly to unlawful entrance upon the property of another. Trespass signs are seen commonly in country districts where owners of groves, private estates and club grounds desire to protect their property from intrusion; disregard of such notices is an unlawful act. Trespass makes one liable to a civil suit for damages.

There are various other forms of trespass, such as injuring a neighbor's property by allowing cattle to get into his cornfield, throwing a stone and breaking his window, or posting a sign on his fence without permission. A person who creates a disturbance in a theater and refuses to leave when ordered to do so by the management is a trespasser. In this case the purchase of the ticket is an act which gives the buyer a license to enter, while the subsequent act of the management is a revocation of the license. Motive does not usually protect a trespasser from action against him. That is, the act of trespass may be done without malice, unintentionally, or through ignorance, but the offender is nevertheless liable to the payment of damages. On the other hand, if the offender commits an act of trespass maliciously, his motive is considered in the matter of allowing damages. False imprisonment and assault and

battery are examples of trespass to the person. *Poaching* is a popular term for trespass upon land for the purpose of obtaining game and fish. Action for damages in cases of trespass comes under the head of torts. See TORT.

**TRIAL BY BATTLE.** See BATTLE, TRIAL BY.

**TRIANGLE,** *tri'ang g'l,* a plane figure bounded by three straight sides. Triangles are classified according to their sides, and according to their angles. One whose three sides are equal is an *equilateral* triangle; one which has two sides equal is an *isosceles* triangle; one that has no two sides equal is a *scalene* triangle. A triangle that has a right angle is a *right triangle;* one that has an obtuse angle is an *obtuse triangle;* one that has all its angles acute is an *acute triangle.* The side upon which a triangle rests is called the *base,* the point opposite the base is called the *vertex.* The distance from the vertex to the base is called the *altitude.* In a right triangle one of the sides is the *altitude;* the side opposite the right angle is called the *hypotenuse.*

**Construction of Triangles.** To the young student the construction of triangles leads to many interesting and valuable discoveries. He finds he cannot have a triangle with any angles he chooses, but only angles whose sum is 180°; he can have but *one right angle* or but *one obtuse angle* in a triangle; he finds that he can choose the size of *two angles,* but the third one is determined for him; he finds he can decide upon a certain number of sides and angles, and the remaining sides and angles are thereby determined. Such construction work can be done with much interest and economy in the sixth, seventh and eighth grades. Indeed, the very keenest interest in it is found in the sixth grade. It opens the way to the more abstract demonstrative geometry of high school. The student should have a rule, a compass and a protractor for this work. Below are a few suggestions as to problems for the student:

1. Construct a triangle with a base of 8 inches, one base angle 50° and the other 70°. Can you make the other two sides of the triangle any length you please? Can you make the third angle any size you please?

See that one side and the two adjacent angles determine the triangle.

2. Construct a triangle, one side 10 inches, another side 6 inches and the angle included between these sides 60°. What do you find about the third side and the other two angles? Did you choose their length or size?

See here another geometric truth—two sides and the included angle determine a triangle.

3. Draw a right triangle; note the position of the sides. The longest side is opposite the right angle. Draw an obtuse triangle. Where is the longest side? In each triangle you have drawn, where is the longer side?

See that these longer sides are opposite larger angles.

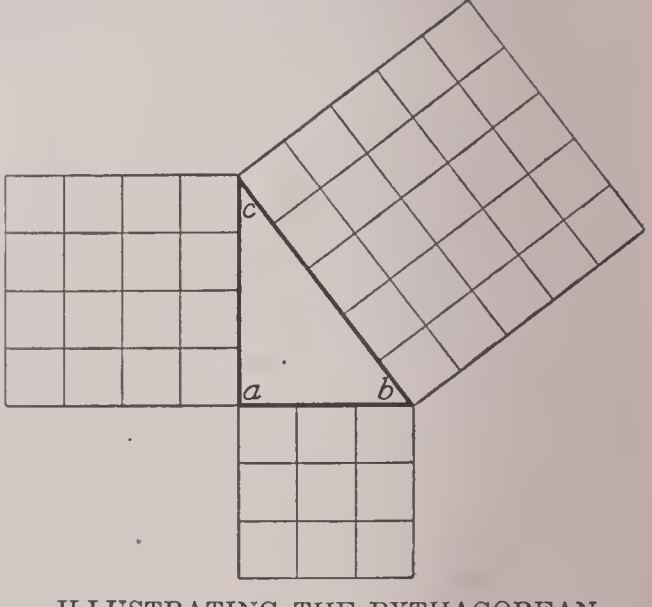
4. Draw an equilateral triangle. Draw one side any length; letter the line *a* at one end, *b* at the other. Take compass and with *a* as a center, and the radius *ab,* draw an arc; with *b* as a center, and the same radius draw another arc. Letter the point where the arcs intersect *c.* Draw straight lines from *c* to *a* and *c* to *b.* Measure the angles of this triangle. What do you find?

5. Repeat Problem 4 but change length of first side.

**The Pythagorean Theorem.** The relation of the sides of a right triangle has been known for many centuries. Pythagoras proved, about 500 B. C., that *the square on the hypotenuse of a right triangle is equal to the sum of the squares on the other two sides.*

Draw a right triangle, *a b c,* base 3 inches and altitude 4 inches. Measure the third side, the hypotenuse.

Draw a square on the base line, draw a square on the altitude line, draw a square on the hypotenuse. How does the square on the hypotenuse compare with the other two squares?




ILLUSTRATING THE PYTHAGOREAN THEOREM

Draw other right triangles and build squares on the sides. How does the square upon the hypotenuse compare with the other two squares in each case? The general truth is stated:

$$\text{Hypotenuse}^2 = \text{Base}^2 + \text{Altitude}^2$$

$$H^2 = B^2 + A^2$$

From this fact, any side of a right triangle may be found when the other two sides are known.

**Problems.** 1. What is the diagonal of a rectangular field 60 rods by 80 rods?

Solution:

$$H^2 = B^2 + A^2$$
$$H^2 = 60^2 + 80^2$$
$$H^2 = 3600 + 6400$$

$$H^2 = 10000$$
$$H = \sqrt{10000}$$
$$H = 100$$

Note: The diagonal of the field is the hypotenuse of a right triangle.

2. A baseball diamond is 90 feet square. How far is it from first to third base? Ans. 127.27+ feet.

3. How far out from a wall must a 12½-foot ladder be placed to reach a window 10 feet from the ground?

Solution:

$$H^2 = A^2 + B^2$$
$$(12\tfrac{1}{2})^2 = 10^2 + B^2$$
$$156.25 = 100 + B^2$$
$$B^2 = 156.25 - 100$$
$$B^2 = 56.25$$
$$B = \sqrt{56.25}$$
$$B = 7.5$$

Distance = 7.5 ft.

When the base and altitude of a right triangle are 3 and 4 or 4 and 3, the hypotenuse is 5, since $3^2+4^2=5^2$. Therefore, when the base and altitude are in the ratio 3, 4 or 4, 3, the three sides are in the ratio 3, 4, 5. This fact has been used as the basis for laying out "square corners." The so-called "rope stretchers" of Egypt are said to have used it in laying out the foundations of the pyramids, and the builder to-day uses it to lay out a foundation. A line 8 feet long is stretched from the desired corner point along in the direction one wall is to take; a line 6 feet long is fastened at the same point and stretched to make a right angle with the first line; a 10-foot pole is laid from the outer extremity of the 8-foot line extending toward the outer extremity of the 6-foot line, which is moved until the 10-foot pole just fits between the extremities of the lines. Then the corner is a right angle.

When the base and altitude are in the ratio 3, 4 or 4, 3, it is very easy to know the hypotenuse; for example:

| B | A | H |
|---|---|---|
| 3 | 4 | 5 |
| 6 | 8 | 10 |
| 21 | 28 | 35 |
| 36 | 48 | 60 |

Find $n$ in each of the following:

| B | A | H |
|---|---|---|
| 15 | 20 | $n$ |
| 18 | 24 | $n$ |
| $n$ | 40 | 50 |
| $n$ | 27 | 45 |
| 27 | $n$ | 45 |
| 44 | $n$ | 55 |
| 51 | 68 | $n$ |
| 1½ | 2 | $n$ |

**Triangular Measurements.** The relations among the sides and angles of triangles make up a large part of the study of trigonometry. One of the objects of trigonometry is to find heights and distances without actually measuring them, as heights of mountains, widths of bodies of water, distance of vessels out at sea, astronomical distances, etc.

**Area of Triangles.** (a) When base and altitude are known, to find area, multiply base by one-half altitude. (For full discussion of this, see MENSURATION.)

(b) When sides are known but altitude is unknown, to find area, find one-half the sum of the sides; from this subtract each side separately. Find the product of half the sum of the sides and the three remainders found above. Take the square root of this product.

Letting $s$ stand for half the sum of the sides, and $a$, $b$ and $c$ for the sides respectively, the law is stated thus:

$$\text{Area } \triangle = \sqrt{s(s-a)(s-b)(s-c)}$$

**Problem.** Find the area of a triangular field whose sides are 21 rods, 28 rods and 35 rods.

Solution:

$$s = \frac{21+28+35}{2} = 42$$
$$\text{Area } \triangle = \sqrt{s(s-a)(s-b)(s-c)}$$
$$\text{Area in sq. rd.} = \sqrt{42(42-21)(42-28)(42-35)}$$
$$\text{Area in sq. rd.} = \sqrt{42\times21\times14\times7} = 294$$

The student will find many opportunities out-of-doors for making and testing square corners by the rope-stretcher method, and for finding the relations between the sides of the right triangle. A.H.

**TRIASSIC SYSTEM,** *tri as'ik sis'tem,* in geology, the rock formations of the oldest division of geologic time in the Mesozoic Era, extending from the Permian Period to the Jurassic (see diagram, page 2439). In the eastern part of the United States the Triassic formation is found from Connecticut to North Carolina. The rock consists chiefly of conglomerate (which see) and sandstone. The sandstone of the Connecticut Valley and New Jersey, so highly prized for building, was formed at this time and is sometimes known as the New Red Sandstone. The Palisades of the Hudson also belong to this period. During this and the Jurassic Period the reptiles attained their greatest size and development, and the older geologists frequently called the Triassic the Age of the Reptiles. Lizardlike animals of gigantic size were common on land, and the sea teemed with other monsters which fed upon fish and upon each other. Fossils are found in considerable numbers.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Geology | Jurassic Period |
| Ichthyosaurus | Mesozoic Era |

**TRIBUNE,** the name given in ancient Rome to either of two officers whose functions were totally different.

The *military tribunes* were originally the leaders of the soldiers furnished by the various tribes, and from this fact the name was taken. During the time of the republic there were six tribunes to each legion, and they ranked next after the commander-in-chief. At first they were appointed by the consuls, but later part or all of them were elected by the people. Under the empire the office declined in importance, and the tribunes came to be little more than the staff of the commander.

The *tribunes of the people* were magistrates elected to protect the rights of the plebeians. In 494 B.C. this class seceded from Rome and refused to return until permission was given them to choose such officers. There were six of these tribunes; they held office for one year only, but were eligible to reëlection. The tribunes had the right to arrest any person, even the consuls; they might veto any measure proposed by the Senate; their persons were inviolable, and through these privileges they became in time the most powerful officers of the state. The gradual acquisition by the plebeians of many political rights which had originally belonged only to the patricians was largely the work of the tribunes. Augustus assumed the prerogatives of this office, and beginning with his reign it lessened in importance.

**TRICHINA,** *tri ki'na,* an animal parasite which, when it finds lodgment in the human system, causes a serious disease known as

TRICHINA

(*a*) The parasite; (*b*) enclosing membrane; (*c*) muscle.

*trichiniasis.* The trichina is a minute worm which inhabits the muscles of pigs, rabbits, rats and other animals. In these creatures it exists as an undeveloped, hairlike organism coiled up in an enclosing sheath, or cyst, and it does not develop beyond this immature stage until it is taken into the human intestine. Human beings usually acquire trichiniasis through eating uncooked, or poorly-cooked, pork. As the meat is digested the immature worms are freed from their cysts, reach a stage of maturity and multiply with great rapidity. The larvae pass through the intestinal walls in countless numbers and are carried by the blood vessels to the muscles, where they find lodgment and become encysted, like the parent worms. The envelope enclosing the worm gradually hardens, and in course of time the stone-forming process extends to the parasite itself, thus ending its activity.

**Trichiniasis.** The first symptoms of the disease are loss of appetite, nausea, weakness and diarrhoea. Then follow pains in the muscles and stiffening of these parts, fever and swelling of the limbs. The disease runs its course in about four weeks; from twenty to fifty per cent of the cases end fatally. After the worms reach the muscles it is impossible to dislodge them, but if strong purgative medicines are given when the infection is first detected, the parasites will be expelled from the intestinal tract, and the disease will be checked. C.B.B.

**TRICOLOR,** *tri' kul er,* a name given to the French national flag, which has three colors, blue, white and red, in equal vertical sections, the blue nearest the flagstaff, the white next and the red at the outer end. The name is sometimes applied to other flags modeled on that of the French. The tricolor was introduced during the French Revolution and is now the sole flag of France. (See color plate, *The Flags of Europe,* following page 2196.)

**TRICYCLE,** *tri' sik 'l,* a three-wheeled vehicle used as a plaything among children and as a wheel chair for invalids. It was introduced for general use in 1876, and many improvements have been made upon the first awkward model. Usually the rider sits between the two large rear wheels, which are propelled by pedals pushed up and down by the feet, while the small wheel in front is used as a balance. The rider steers by using a long handle attached to the front wheel. Since the perfection of the bicycle (which see) tricycles have been less popular than formerly, except among small children.

**TRIESTE,** *tre es' tay,* or **TRIEST,** *tre est',* a flourishing manufacturing city of former Austria-Hungary, but after the War of the Nations given to Italy, is at the extreme northeastern angle of the Adriatic Sea, on a small, crescent-

shaped bay called the Gulf of Trieste. The city is about seventy-three miles northeast of Venice and 367 miles southwest of Vienna (see map, following page 2092). It is the capital of the province of Küstenland, and with surrounding territory constitutes a crownland about forty square miles in area. Trieste is an important coaling and supply station for the Austrian navy, and possesses a naval arsenal. There are two sections to the city—the old town with steep, narrow streets, clustered about the Schlossberg (Castle Hill), and the new portion, on the flats along the bay. The Corso, the city's busiest thoroughfare, divides these two sections. Conspicuous features of Trieste are a group of new municipal buildings, a nautical academy, several museums, the public gardens, an observatory, a public library of over 120,000 volumes, the magnificent offices of the Austrian Lloyd, the most important shipping firm, and several handsome churches and public squares.

The harbor is spacious and up-to-date, and docking facilities are increased by the Canal Grande, which enters the city north of the Corso. In normal years over 14,000 vessels clear the harbor annually. Besides naval stores and ships, manufactures include marine steam engines, furniture, beer and wine, soap, clothing and textiles. During the War of the Nations (which see) Trieste was on several occasions bombarded by airships, and it was the objective point of the great Italian drive under General Cadorna, in the summer and fall of 1917. In September the Italian forces penetrated to within a dozen miles of the city. In 1910 the population of the city was 160,993; of the former Austrian crownland, 229,510. The people are largely Italians.

**TRIGONOMETRY,** *trig o nom' e tri,* a branch of mathematics having to do with the measurement of triangles and with the relations of their sides and angles to one another. It follows geometry in the regular course of study and depends upon certain truths there demonstrated: that the sum of the angles of a triangle is always equal to two right angles; and that, if three parts of a triangle, at least one of which is a side, be known, the remaining parts may be computed.

The two chief divisions of trigonometry are *plane* and *spherical.* Plane trigonometry treats of such angles as lie wholly in a plane, and spherical trigonometry of angles that lie upon the surface of a sphere. To facilitate the computations to which operations in trigonometry give rise, tables of logarithms (which see) have been prepared. They were added to the science by Napier in the seventeenth century.

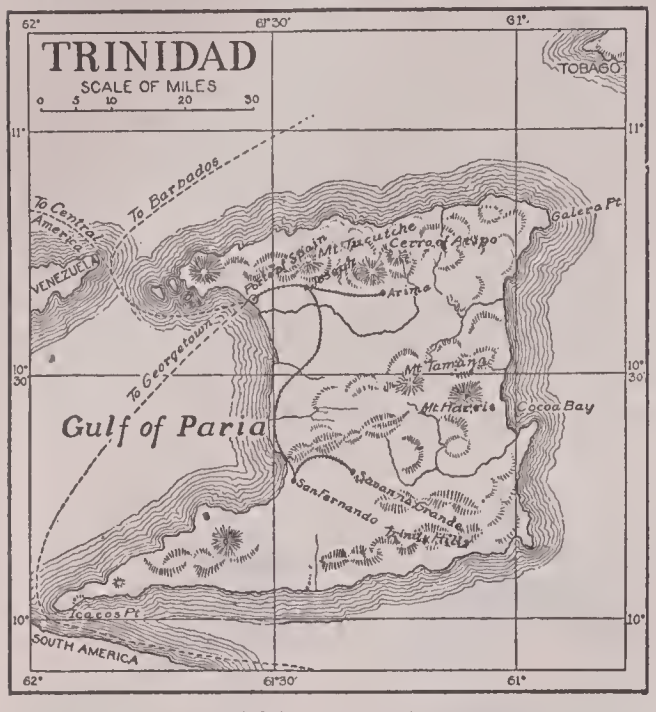
The practical uses of trigonometry are many and important. Plane trigonometry, for example, is used extensively in astronomy, physics and engineering, and spherical trigonometry is used in astronomy and in measuring long distances on the surface of the earth, where its curvature must be taken into consideration. In surveying, the science is used in determining distances and in measuring the height of mountains and other lofty objects.

**TRILLIUM,** *tril' i um,* or **WAKE-ROBIN,** the names of several species of plants belonging to the lily family, so called because their flower parts are in threes and because they frequently bloom early in the spring, in time to "wake"

THE PAINTED TRILLIUM

the robins. They are among the loveliest of the early wild flowers. The trilliums have three sepals, three petals, two times three stamens and three styles, and each flower blossoms from a cluster of three leaves. *Dwarf* trillium bears its solitary, pure white flower at the end of a stem not over six inches high. This stem rises from a small, tuberlike rootstock, said to be poisonous. *Large-flowered* trillium has flower petals two inches or more in length; though white at first, the blossoms generally become rose-colored later in the season. More striking than either of these is the *painted* trillium, whose wax-white petals have stripes of wine or deep pink. The fruit of the trilliums is a red berry. These flowers are found usually in moist woodlands.

**TRIN'IDAD,** the second largest island of the British West Indies, lies six miles east of the coast of Venezuela, near the mouths of the Orinoco River. It is larger than the state of Rhode Island, for it is about 1,754 square miles




LOCATION MAP

The nearness of Trinidad to the mainland of South America is shown on the map in the west and in the southwest corner.

in area, and except for one projection is rectangular in shape. In the north and south there are ranges of hills furrowed with many ravines and covered to the very top with dense forests. The most striking natural features are Maracas Falls, where a river leaps in a torrent over a wall of rock 312 feet high, and Pitch Lake, which furnishes the bulk of the world's supply of asphalt (which see). The soil around Pitch Lake is full of asphalt, but is very fertile. The road from the lake to Labrae, the nearest port, is built on a bed of asphalt, and is constantly moving towards the sea, like a glacier.

Trinidad is an English crown colony, with the seat of government at Port de Spain. Its population in 1911 was 333,552. About a third of the people are East Indians, whose immigration from India has been encouraged by the English government. The upper classes are creoles of British, French and Spanish blood; the rest of the people are negroes. Besides asphalt, Trinidad exports cocoa, sugar, rum, molasses, coffee, tobacco, fruit, timber, dyewoods and india rubber. See WEST INDIES.

**TRINIDAD,** COLO., the county seat of Las Animas County, situated in the stock-raising, coal-mining and agricultural section, in the extreme southern part of the state. Trinidad is ninety-one miles south of Pueblo and 685 miles southwest of Kansas City. Its site is on the Las Animas River, about fifty miles east of the Continental Divide. It is served by the Atchison, Topeka & Santa Fe, the Denver & Rio Grande, the Colorado & Wyoming and the Colorado & Southern railways, and electric lines operate north and south. The prosperity of the city depends mainly on the mines and on the agricultural products of the vicinity; the annual output of the mines is estimated at $6,750,000. The industrial establishments include railroad offices and shops and a wool-scouring mill. Trinidad has a $380,000 county courthouse, constructed in 1916; a $200,000 Federal building, erected in 1903; a high school, a business school, Saint Joseph's Academy, San Rafael Hospital and a Carnegie Library. In 1910 the population was 10,204; in 1916 it was 13,875 (Federal estimate).

**TRINITY,** *trin'i ti,* the conception of God as one, and yet as having a threefold personality, Father, Son and Holy Spirit. The doctrine is a development of Christian theology, not being taught in the Old Testament, but capable of being deduced from passages in the New Testament. The first authoritative statement of belief in Father, Son and Holy Spirit was made by the earliest general council of churches, held at Nice in 325, which also declared the Son to be of equal substance with the Father. With regard to the Holy Spirit, the East and West subsequently divided, the Eastern Church holding procession of the Spirit from the Father through the Son, and the West procession alike from Father and Son. In the Protestant view, Father, Son and Holy Spirit are equal, each having a specific activity, the Father that of creation, the Son that of redemption, and the Spirit that of sanctification, but the doctrine of the three in one is considered to be a mystery for which there is no adequate explanation.

**TRINITY SUNDAY,** the Sunday after Pentecost, or *Whitsunday,* sacred to the celebration of the Trinity, and introduced into the Church calendar by Pope John XXII (1316-1334). It concludes the principal Church festivals of the year, and the succeeding Sundays till Advent are called Sundays after Trinity. The receiving of Holy Communion between the first Sunday of Lent and Trinity Sunday is obligatory on all communicants in the Roman Catholic Church.

**TRIP HAMMER,** a power hammer used principally in such forgings as do not require the heavy blows of a steam hammer. It is mounted on a pivoted beam, which has an

upward and downward motion. The hammer is raised by the action of a revolving cylinder with cams, and is released when it has reached the highest point within the range of lift of the cams, falling by its own weight. Unlike the action of the steam hammer, the stroke of the trip hammer cannot be controlled. When the hammer drops it does so with full weight. It may, however, be released before it is raised to its extreme height, which lessens the force of the blow.

A form of speech commonly heard refers to *trip-hammer blows,* meaning that the blows are delivered with every ounce of force available.

**TRIPLE ALLIANCE,** *trip''l al i'ans,* a name given at various times to a union by treaty of three powers of Europe for stated periods of time, to assure protection for each member against outside powers and to preserve the balance of power between European states. The first treaty of this kind was signed in 1668 by England, Holland and Sweden to prevent Louis XIV of France from taking possession of the Low Countries (now Holland and Belgium). Another alliance for the purpose of checking the power of Spain was made in 1717 between Great Britain, France and Holland.

**The Last Triple Alliance.** In 1882, Germany, Austria-Hungary and Italy allied themselves by treaty to prevent the acquisition of territory in the Balkans by Russia and to prevent France from declaring war upon Germany. This treaty was broken by Italy in 1915 when that country not only refused to aid Austria and Germany in the War of the Nations, but declared war upon Austria in 1915 and did not remain in a cordial mood toward Germany. Italy claimed that Germany first violated the terms of the Alliance by declaring war upon its enemies without consulting the Italian power at Rome. This omission of a clear obligation Italy resented, as it seemed to indicate that the Germanic powers considered the Italians a minor factor, or that Italy was not greatly above the position of a vassal state. Moreover, the alliance was entered into for defensive purposes, and in the War of the Nations Germany assumed the offensive. Thus Italy was justified in refusing its assistance. See War of the Nations.

**TRIPLE ENTENTE,** *ahn tahnt',* the French term for *triple alliance.* The outbreak of the War of the Nations in 1914 found the chief powers in Europe divided into two opposing groups—the Triple Alliance, consisting of Germany, Austria-Hungary and Italy; and the Triple Entente, composed of England, France and Russia. The Triple Alliance had been formed in 1882, and to offset its influence France and Russia had concluded a dual alliance in 1895. In 1904 England settled outstanding differences with France and in 1907 came to an understanding with Russia about their respective policies in Persia, Afghanistan, Tibet and other regions where their interests conflicted. These arrangements resulted in the formation of the Triple Entente. In the beginning the league was nothing more than an informal alliance, but after the outbreak of the great war closer consolidation was deemed necessary, and on September 5, 1914, each of the Entente powers joined the others in a definite agreement and promised not to conclude a separate peace with the Central Powers. The Triple Alliance came to an end in 1915, when Italy declared war upon Austria-Hungary and joined the Entente allies. The entrance of Italy into the war changed the original league into the Quadruple Entente. See War of the Nations.

**TRIP'OLI,** the name commonly applied to one of the Barbary states, an Italian dependency on the northern coast of Africa, lying between the Libyan Desert on the east and Tunis and the Sahara Desert on the west (see map, page 588). The southern boundary is indefinite, but the southern part includes Fezzan, which is bounded on the west by the French Sahara. The total area is estimated to be 406,000 square miles; the population, according to the census of 1911, is made up chiefly of 523,000 natives (Berbers) and about 6,000 Europeans. There are also large numbers of Jews. When the region was annexed to Italy in 1911, the Italian government announced that *Libya,* the ancient name of the country, was to be restored. Hence the official Italian name of Tripoli is *Libya Italiana.*

For administrative purposes the dependency is divided into the independent districts of Tripolitania and Cyrenaica; the city of Tripoli (73,000 inhabitants) is the capital of the former, and Benghazi (35,000) of the latter. The location of these cities is shown on the map of Africa, opposite page 81. Italian is the official language, but Arabic is spoken by the majority of the people.

Much of the country is a barren, elevated plateau, with occasional oases along the watercourses, which are filled with water only in the rainy season. There are no permanent streams, but springs frequently occur. There is a stretch of fertile country about Tripoli city. Wheat,

saffron, barley, grapes, dates, figs, olives, lemons and almonds are grown, and the raising of sheep is of considerable importance. In general, the country is not well developed. Sponge fishing has been carried on since 1885, and there

CHARACTERISTIC SCENE IN TRIPOLI
A date palm orchard.

is some exploitation of the salt and sulphur deposits along the coast. Inland communication is chiefly by means of caravan routes, and these routes are often the scenes of bandit raids. Railroad building, however, has been started. Ostrich feathers, carried by caravans from Central Africa to the city of Tripoli, are exported in large numbers to London and Paris when there is a demand for them. Other exports, brought from interior Africa, include gold, ivory and rubber.

Tripoli in ancient times was a part of the territory of the Carthaginians, from whom it was wrested by the Romans. After passing in turn to the Vandals, Greeks and Arabs, it became in the sixteenth century a dependency of the Turkish Empire. For a century previous to 1835 the sultan's authority was only nominal, but in that year the ruling bey was deposed and a new Turkish governor was appointed. The state then became a Turkish vilayet. Early in the same century the navy of the young American nation successfully defended the rights of merchant vessels in the Mediterranean Sea and forced the Tripolitans to cease their acts of piracy. Tripoli was taken from Turkey in 1911 as the result of a brief war between that nation and Italy (see ITALY, subtitle *History*).

**Tripoli,** the principal city and seaport, occupies a promontory on the Mediterranean. From the sea the city presents an interesting picture, with its surrounding walls, minarets, mosques and ancient ruins, but a closer view shows the narrow streets and low, mean houses of the typical Oriental town. It is the terminus of three caravan routes and carries on the manufacture of rugs, scarfs and leather. The Jews are the most active tradesmen. Its chief points of interest are the imposing castle of the beys and the ruins of a triumphal arch erected to Marcus Aurelius. J.S.C.

Consult Todd's *Tripoli, the Mysterious;* Lapworth and Zimmerman's *Tripoli and Young Italy.*

**Related Subjects.** In connection with this description of Tripoli the reader may consult the following articles in these volumes:

Barbary States
Berbers
Italy, subtitle *History*
Turkey, subtitle *History*

**TRIPOLI,** a mineral resembling clay or chalk, composed chiefly of minute shells containing silica, which are so hard that they will scratch glass. Thick deposits of tripoli are sometimes found under peat beds. When ground to a fine powder tripoli is used for polishing glass, metals and marbles. It takes its name from the fact that it was originally brought from Tripoli in Africa. It is found in the eastern part of the United States, in France, Italy, Germany and Nova Scotia.

**TRIREME,** *tri'reem,* a word derived from the Latin *tres,* meaning *three,* and *remus,* meaning *oar,* refers to an ancient war vessel, invented by the Corinthians, having three sets of oars arranged one above another. The trireme was steered by paddles at the stern, and was provided with sails to use when not in battle. The vessel was of light draught and could easily be hauled on shore, and it was quickly and skilfully maneuvered in battle. At Salamis, the great naval battle between the Persians and Greeks in 480 B.C., the Grecian fleet numbered 380 ships, most of which were triremes. See full-page illustration, under WARSHIP.

**TRIUMPH,** *tri'umf,* a word of uncertain origin, but probably derived from the Greek *thriambos,* the name given to a procession in honor of the god Bacchus. In ancient Rome a triumph was the highest honor that could be bestowed on a general on his return from a successful campaign. The victor entered the city of Rome in a triumphal car drawn by four horses. He was crowned with laurel and bore a scepter in his left hand, a laurel wreath in his right. The Senate, on foot, headed the procession, with the magistrates, followed by a large body of trumpeters. A train of carriages laden with spoils of war came next. Oxen to be sacrificed and the priests of the sacrifice walked in front of distinguished captives and inferior prisoners, the latter in chains. The victor, hero of the day, was accompanied by his children and friends, the rear of the procession being

formed by soldiery, who were given free license to sing or to jest.

Under the Empire none but the emperor could be given a triumph; successful generals received rewards and decorations only, although a lesser triumph was occasionally given a great general, in which case the victor walked, and was not crowned. This was called an *ovation,* and concluded with the sacrifice of a sheep instead of a bull or ox. The Latin *ovis,* the name of the genus to which sheep and goats belong, gave the name *ovation* to the minor triumph.

A triumph given to a naval commander was very similar to that given a general, but was usually on a smaller scale and marked by naval display, prows of ships and other nautical trophies being borne through the streets.

**TRIUMVIRATE,** *tri um' vi rate,* in ancient Rome the name given to any board of three men united in office. The famous First Triumvirate, composed of Caesar, Pompey and Crassus, had no real right to the name, as it existed without legal sanction. Octavius (Augustus), Lepidus and Antony formed what was really a triumvirate, for their coalition was legalized by the Senate.

**Related Subjects.** The history of these famous triumvirates may be learned from the following articles in these volumes:

| | |
|---|---|
| Antony, Mark | Lepidus, Marcus Aemilius |
| Augustus | Pompey |
| Caesar, Caius Julius | |
| Crassus, Marcus Licinius | |

**TROGON,** *tro' gahn,* a group of birds found in warm regions in both the eastern and the western hemispheres, noted for their beautiful plumage. They have a peculiar foot structure, as the first and second toes are reversed. The bill is short and strong, the tail usually elongated, and the feet are small and weak. The Old World trogons feed chiefly on insects; the American species eat fruit, lizards, grasshoppers, ants, beetles and small crabs. One of the most interesting and brilliantly colored of the group is the Central American *quetzel.* For description and picture of this bird see page 4901.

**TROIS RIVIÈRES,** *trwah re vyair',* a city in Quebec. See THREE RIVERS.

**TRO' JAN WAR.** See TROY.

**TROLLING,** *trohl' ing,* a method of fishing with a moving line. It is a sport dear to the angler who does not care for an easy victory, for the fish that are caught in this fashion are worthy of any fisherman's mettle. The giant tarpon of the West Indies and the Florida coast and the savage muskellunge, the undisputed monarch of the northern lakes, are among the chief prizes taken by trolling. In order to make the lure more tempting to the fish, the angler uses what is called a spinning bait, which deceives the fish into believing it is about to swallow a live morsel. Originally this was simply the bowl of a teaspoon to which a hook had been soldered; the present spoon hook, however, is a bit of flat, polished metal, which skips and spins along the surface of the water. It is made still more irresistible to hungry fish by a gaudy tuft of feathers. The line, which must be particularly tough and strong for the heavier fish, is usually trailed from the stern of a skiff or launch, but trolling from the shore is also practiced. See ANGLING.

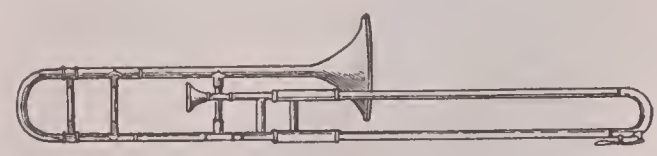
THE TROGON

**TROLLOPE,** *trol' up,* ANTHONY (1815-1882), an English novelist, born in London. His education was not extensive, for it consisted of a course at a public school; and when at twenty years of age he entered the postal service he had given no promise of the unusual literary ability that he later displayed. The first of his works appeared during the years 1847-1850, but it was not until 1855, when *The Warden* was published, that he won marked recognition. Following this came others, continuations, in a sense, of the first, *Barchester Towers, Doctor Thorne, Framley Parsonage* and *The Last Chronicle of Barset.* In this group of novels the society of the English cathedral town is reproduced in a most careful manner, and with great humor and pathos. In the second and

the last of the series appears Mrs. Proudie, his best-known character.

Trollope was an industrious worker. Of the many writings that followed his first successful ventures may be mentioned *The Three Clerks, The Bertrams, Orley Farm, Can You Forgive Her?, Phineas Finn, The Eustace Diamonds, He Knew He was Right,* containing a penetrating analysis of jealousy, *The Way We Live Now, The American Senator* and biographies of Caesar and Cicero. Very popular in his own day, Trollope's novels have been somewhat neglected since his death, but of late years there has been the revival of interest in them. Trollope wrote a sketch of Thackeray for the English Men of Letters series.

**TROM'BONE,** a musical instrument on the order of a trumpet, used in orchestras and military bands because of the volume, depth and richness of its notes. It consists of a tube twice bent, ending in a trumpet-shaped bell and



THE TROMBONE

sounded by means of a cup-shaped mouthpiece and a slide mechanism. By the manipulation of the slide the air tube is altered in length and the pitch is accordingly varied from the fundamental. The instrument is at its highest pitch when the slide is closed. Like the violin, the trombone has a complete chromatic scale. There are four sizes, called *alto, tenor, bass* and *contrabass.* The forms usually seen in concert halls are the alto, tenor and bass, for when played together these three sound in perfect harmony. Music for the contrabass is a part of the score of Wagner's *Nibelungen Ring.* In a later type of instrument there are rotary valves instead of the slide mechanism, but the tones produced are less pure than in the older type.

**TROMP,** Martin Harpertzoon (1597-1653), a Dutch naval officer, who during his career was victor in more than thirty naval engagements, was born in Brielle, Holland. His father was captain of a merchantman, and Martin went to sea with him when nine years old. Two years later, in a fight with an English frigate, the elder Tromp was killed and the boy was taken prisoner. He was subsequently captured by Moslem pirates, and little then is known of his life till after his escape several years later, when he returned to Holland to take service under the Dutch flag.

In 1622 he was made lieutenant, and two years later was captain of a frigate. When in 1637 he attained the rank of vice-admiral, he reorganized his fleet, which was poorly equipped and badly trained. In 1639 he started out after the enemies of his country, and won a brilliant victory over the Spanish fleet off Gravelines, completely destroying it. On his return Tromp was enthusiastically received, and was soon made admiral of Holland.

When, in 1652, the English, by the Navigation Act and other oppressive measures, precipitated the war with Holland, Tromp was entrusted with his country's defense. At first he was victorious against the English commander, Blake, even with grossly inferior equipment, and controlled the English Channel for about three months. The British then built new and powerful ships, and when in February, 1653, Tromp left Holland with a convoy of richly-laden merchantmen, Blake attacked him. Tromp kept up a gallant running fight, and though his vessels were shattered, with cool judgment and heroism he managed to bring 125 merchantmen safely to Holland.

Again, in June of the same year, the two fleets met, but the Dutch vessels, poorly manned and equipped, were no match for the enemy, and sought refuge in the Texel. Yet once more Holland got together an inferior fleet (composed mostly of converted merchantmen) and Tromp set out on what was acknowledged a "desperate task." He broke the English blockade, but twenty-four of his ships deserting, the British won the victory. In this battle Tromp was shot through the heart, his last words being "Be of good courage!" There is a magnificent monument to his memory at Delft. R.D.M.

**TRONDHJEM,** *tron'yem,* a seaport and industrial city in Norway, ranking next to Christiania and Bergen in population. It is picturesquely situated amid surrounding hills, and lies at the mouth of the Nid River, on the southern shore of the Trondhjem Fiord. Trondhjem is a city of wide, regular streets, but its houses are nearly all built of wood. Its Anglo-Norman cathedral is the most imposing church in Norway, and is the scene of the coronation of Norway's kings and queens. Other interesting features are the fortress of Christianssten, a marine arsenal, and the museum of the Society of Sciences. There is considerable activity in shipping. The chief exports are copper ore, iron and pyrites, wood pulp, timber and fish. The industrial establishments include

shipyards, sugar refineries, sawmills, breweries and machine shops. Population in 1910, 45,335.

**TROPIC BIRD** or **BOATSWAIN,** *boht' swayn,* a bird which flies continually over tropic waters, diving perpendicularly for fish, in the manner of terns, but distinguished from them by its long, willowy, middle tailfeathers. Its plumage is pure white or pinkish in color and of a remarkably soft, satiny appearance. The best-known species is the *red-billed tropic bird,* which occurs accidentally as far north as Newfoundland. It is pure white, with a coral-red bill, and is nearly forty inches in length, twenty-six inches being the measure of the tail. Others are the *yellow-billed* and the *red-tailed tropic birds.* All species nest in colonies, in holes or crevices in the rocks or on the bare sand. The one egg is whitish or brownish, mottled with dark brown. Male and female incubate in turn.

**TROPICS,** *trop' iks,* in astronomy, two circles on the celestial sphere, lying parallel with the equator and distant from it twenty-three and one-half degrees each. They mark the seeming limits of the sun's journeys north and south of the equator. The northern one touches the ecliptic at the zodiacal sign Cancer, and is accordingly called the Tropic of Cancer; the southern tropic takes the name Capricorn for a similar reason.

**In Geography.** The tropics are the two parallels of latitude which pass through the extreme southerly and northerly points on the earth's surface at which the sun can be seen directly overhead. The tropic north of the equator is the Tropic of Cancer and that south of the equator the Tropic of Capricorn. Each is twenty-three and one-half degrees from the equator. The tropics mark the limits of that zone of the earth's surface which has the highest temperature, with a comparatively small range of variation throughout the year. This is called the *torrid zone.* The regions included in the torrid zone are usually spoken of as the *tropics.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Astronomy | Capricorn |
| Cancer | Zone |

**TROTZKY,** *trots' ki,* LEON (born 1877), whose real name is LEBER BRONSTEIN, is a Russian Jew who rose from penury to the second most powerful post in Russia after the revolution of 1917. He had lived in Siberia as an exile from 1905 to 1912, afterwards roaming over Europe as an agitator and finding for a time a haven in New York City among the anarchistic elements of the lower East Side. In America he earned $12 per week as editor of a radical periodical, and was a well-known member of New York's revolutionary element.

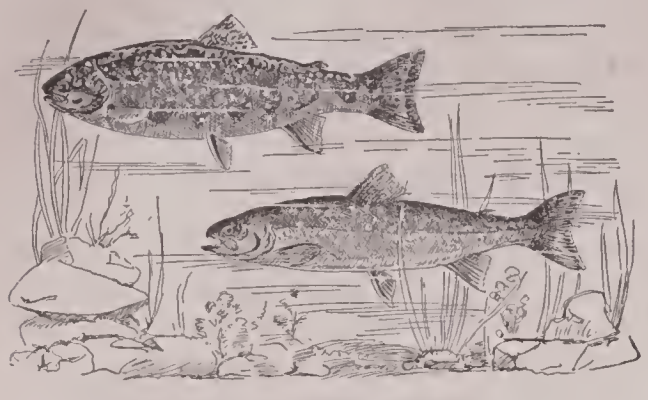
After the czar's downfall he hurried to Russia and allied himself with Nikolai Lenine as an autocrat in the new Bolshevist government, becoming Minister of Foreign Affairs and later Minister of War. The rule of these two men is outlined in the article RUSSIA. See, also, LENINE, NIKOLAI.

**TROUBADOUR,** *troo' ba duhr,* a group of lyrical poets who flourished in Southern France between the eleventh and the fourteenth centuries. As composers of charming love poems, expressed in the musical Provençal dialect, they stand out in literary history as interesting figures of the romantic age of chivalry. They idealized beauty, grace and courtesy, and in their verses lauded the romance of war and adventure, but more than all, they sang of the beauty of love. They led a wandering life, traveling from court to court and singing their verses to admiring knights and their ladies. Those of the troubadours who could not sing taught their verses to professional musicians called *jongleurs.* Sometimes the jongleurs accompanied the poets and played while the latter sang, and occasionally the jongleur himself was a troubadour.

**TROUT,** a group of fish belonging to the same family as the salmon, many species of which are important food and game fish. Nearly all kinds of trout are inhabitants of fresh waters, and they are much sought by anglers who frequent northern lakes and rivers. As a rule they are gamy and possess voracious appetites. Scientists divide trout into two main classes, according to the shape of the vomer, or bone forming the front part of the roof of the mouth. One group, represented by the salmon trout, has a flat vomer, with teeth on its shaft; the other group has a boat-shaped vomer, with teeth on the head of the bone. The latter class embraces the charrs, or true trout. Salmon trout (which see) are structurally the link between salmon and trout.

Of all the charrs, none is more widely known than the *brook trout,* an active and beautiful fish found originally in the Appalachian regions, westward through the Great Lakes territory to Minnesota, and in the Dominion of Canada from the Saskatchewan River to Labrador. It is native to these regions, but has been introduced into various lakes and streams of the Upper Mississippi Valley and the West. It

thrives in cool, clear waters with a gravelly bottom, where the current is strong, and there are rapids and deep pools. Spawning time begins in August in the vicinity of Lake Superior, but farther south the season is much later. These



TWO SPECIES OF TROUT
Above, brook trout; below, the Dolly Varden.

fish spawn in cold weather, and the eggs hatch when the temperature of the water has begun to rise in the spring. The brook trout attains a length of a foot and a half in large bodies of water, but fish of this size are becoming rarer all the time owing to their popularity as game. They are among the most beautiful of the charrs. Anglers speak of their coloring as the "bloom of the trout," for the back is marked with dark olive and black, the sides are spotted with red, and the fins have dark and orange mottlings. The season for angling for brook trout is strictly limited by law.

The native trout of the Pacific coast waters is the *Dolly Varden,* a fish with a more slender body than the one described above, and with red spots on both the back and sides. The larger specimens are two or three feet long and weigh from five to twelve pounds. The flesh is delicious, like that of the brook trout, and the Dolly Vardens taken in swiftly-flowing, cold streams are game fighters.

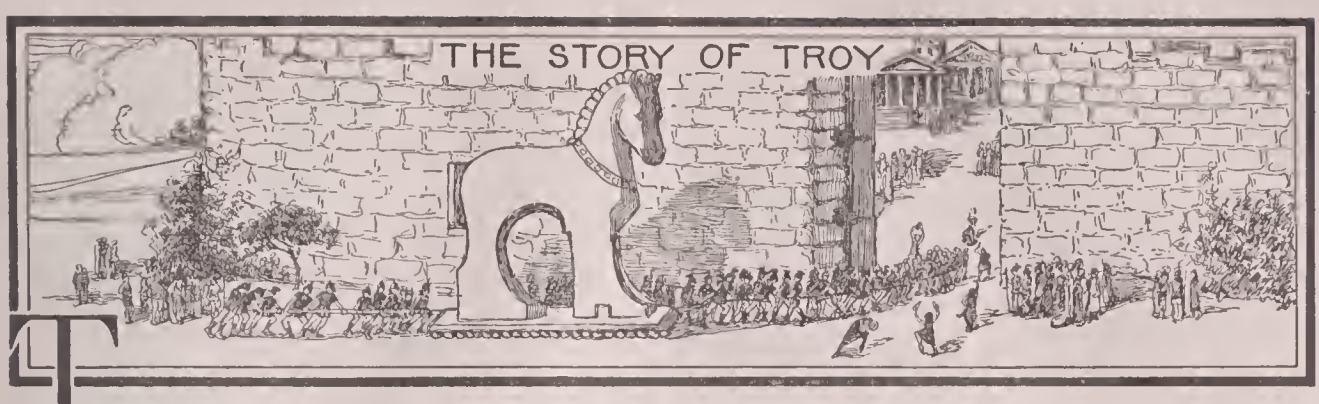
The most northern charr, the *Arctic,* is found north of Hudson Bay. This fish is characterized by a slender body and small head, and is of a dull greenish color, silvery or reddish below and with the lower fins yellowish. It connects an American species, the *sunapee,* with the *European brook trout,* found in cold lakes and mountain streams in the northern part of the continent. The sunapee is an inhabitant of Sunapee Lake, New Hampshire, and Flood Pond, Maine, two lakes whose waters are very cold and clear. It is noted for its beautiful coloring and active, graceful movements. See FISH. M.W.

Consult Jordan's *Fishes;* Jordan and Evermann's *American Food and Game Fish.*

**TROUVÈRES,** *troo verz',* medieval court poets, who were, to the north of France, what the *troubadours* were to the southern part of that country (see TROUBADOUR). The name comes from the French word *trouver,* meaning to *find,* or *invent.* These poets invented songs and metrical tales which were sung or recited by others or by the trouvères themselves. Though some of their writings were narrative in character, the majority concerned themselves with the subject of love, treated not in the spontaneous, emotional manner of the troubadours, but somewhat artificially. The trouvères occupy an important place in early French literature, and helped to develop the French characteristics of wit and refinement. See FRENCH LITERATURE, subhead *Early Stage.*

**TROVATORE, IL,** *eel tro va to'ra* (*The Troubadour*), a famous opera by Verdi, some of the airs of which are as well known as any in all opera. The *Miserere,* in particular, has always been a popular favorite, in part because of its emotional appeal but chiefly because of its melody. *Il Trovatore* was presented for the first time in Rome, in 1853, and two years later was heard for the first time in America. The libretto, which is by Camarano, is based on a Spanish drama, and tells the tragic story of Manrico, the troubadour, and his love for Leonora. Manrico is supposedly the son of the gypsy Azucena, but in reality is the brother of the Count di Luna, who is his rival for the love of Leonora. See VERDI.

**TROWBRIDGE,** *tro'brij,* JOHN TOWNSEND (1827-1916), an American novelist, poet and writer of stories for boys, was born on a farm near Ogden, N. Y. He obtained a part of his education at a country school, but the larger share of it he acquired by himself. Before he was twenty years old he taught school for two years in Illinois; then went to New York and later to Boston, to write for newspapers and magazines. He was connected with a number of publications as contributor and editor, and has written some thirty interesting and wholesome stories for boys, besides other volumes of fiction and poetry. *My Own Story,* which appeared in 1903, is his autobiography. His first book, *Father Brighthopes,* attracted little attention, but *Neighbor Jackwood,* a story of New England life and a strong protest against slavery, published in 1857, made him prominent. His best poems are found in *Vagabonds and Other Poems.* Among his books for boys are *Cudjo's Cave, The Jack Hazard Series, His One Fault* and *The Prize Cup.*




**TROY,** or **IL'IUM,** an ancient city of Asia Minor, made famous by one of the greatest poems in the world—the *Iliad*. That there really was such a city, recent excavations have made very probable, and the large part which it played in the legends of the Greeks shows that it must have been a place of considerable size and importance. All the marvelous things which the Greeks told of Troy happened in the prehistoric days in the twelfth century B. C.; but within historic times, about 700 B. C., the Greeks built a city, Ilium by name, on what they supposed was the site of the ruined city. Whether the story of the Trojan War be simply legend, or whether it lie on the borderland between history and mythology, can never be known, but that does not affect the value of the tale, which remains to this day one of the freshest and most fascinating of stories. The following paragraphs give a summary of the tale.

## *The Trojan War*

**Paris.** In the days of Priam, the king, Troy became a great city, but there were signs of approaching disaster. When Prince Paris was born it was foretold that he should bring trouble to his country, and to avoid this the royal father ordered the boy to be exposed on the hillside to die. The servants did his bidding, but scarcely had they gone when an old shepherd found the beautiful boy and carried him to his home. There Paris grew up as the shepherd's son, tending the flocks of his foster-father on Mount Ida.

**The Golden Apple.** When Paris had become a young man, handsome as a god, there occurred a wonderful wedding, to which no one thought of inviting him. It was the wedding of the sea nymph Thetis with Peleus, and to it came all the immortals except Eris, goddess of discord. To avenge the slight shown her, Eris threw among the guests a golden apple bearing the inscription, "For the fairest," and she accomplished her purpose, for out of it arose a wrangle which resulted in the disastrous siege of Troy. Venus, Juno and Minerva all jealously claimed the apple, and a most unseemly quarrel ensued, of which Paris was finally chosen as judge.

All three goddesses appeared before him on Mount Ida, each offering him a bribe if he would decide for her.

"I will give you power and riches," declared Juno.

"I will make you a famous warrior," said the martial Minerva.

"I shall give you the most beautiful woman on earth for your wife," smiled Venus.

Not because of her promise, but because she was really the most beautiful, Paris gave the apple to Venus. He needed no beautiful wife, for he had already wedded the nymph Oenone, whom he loved; but by his decision he won not only the hatred of Juno and Minerva, but the still more disastrous favor of Venus.

**Helen of Troy.** Very shortly Paris was recalled to his father's palace, and soon afterward set out on a journey to Sparta, in Greece, urged on by Venus, though this he did not know. There he met Helen, wife of the Spartan king Menelaus, and the most beautiful woman on earth, and with her he fell in love. Through the influence of Venus, Helen returned his love. Whether she consented to flee with him to Troy or he abducted her, there is doubt; but she went, forgetting apparently that all the heroes of Greece had promised to aid her husband if any disaster ever overtook him. The heroes were true to their oath, and preparations for the expedition began immediately after the flight.

They were not made in a moment, these extensive preparations, and many difficulties stood in the way of the Greeks. First Ulysses, wisest of the Greeks, had to be induced to join the expedition; then Agamemnon, the Greek com-

mander-in-chief, had to placate Diana by the sacrifice of his daughter Iphigenia, but finally the fleet set sail for Troy, where preparations had also been in progress.

**The Siege of Troy.** For nine years the struggle went on with varying fortunes. The Trojans were compelled to shut themselves up within their city, but beyond that the invaders were able to accomplish nothing. Then came the "ruinous wrath" of Achilles, greatest of Greek heroes, which was almost fatal to the Grecian cause and which he was induced only by the death of his friend Patroclus to lay aside. With Achilles once more fighting for them, the Greeks felt a return of confidence, and when Hector, the noble hero of Troy, was killed, it seemed as if their victory was won. But Achilles himself was put to death soon afterward by the treacherous Paris, and matters were again at a standstill.

**The Wooden Horse.** But the crafty Ulysses devised a plan. He induced the Greeks to build a gigantic wooden horse and to conceal in it a body of armed men, while all the rest of the Greeks took to their ships, apparently with the intention of sailing for home. The stratagem was successful. The curious Trojans, despite the warnings of Laocoön, priest of Neptune, dragged the wonderful horse within the city walls, and in the night the armed men crept out and let into the city the Greek forces, which had stolen back under cover of the darkness. The terrified Trojans rushed from their houses only to fall by the swords of the Greeks, and in a brief time the whole city was in flames. A few escaped, and one great chieftain, Aeneas, embarked on a most marvelous voyage (see AENEID).

So fell Troy. The Greeks could claim for themselves no proud victory, since it was by craft and not by valor that the long siege was ended. A.MC C.

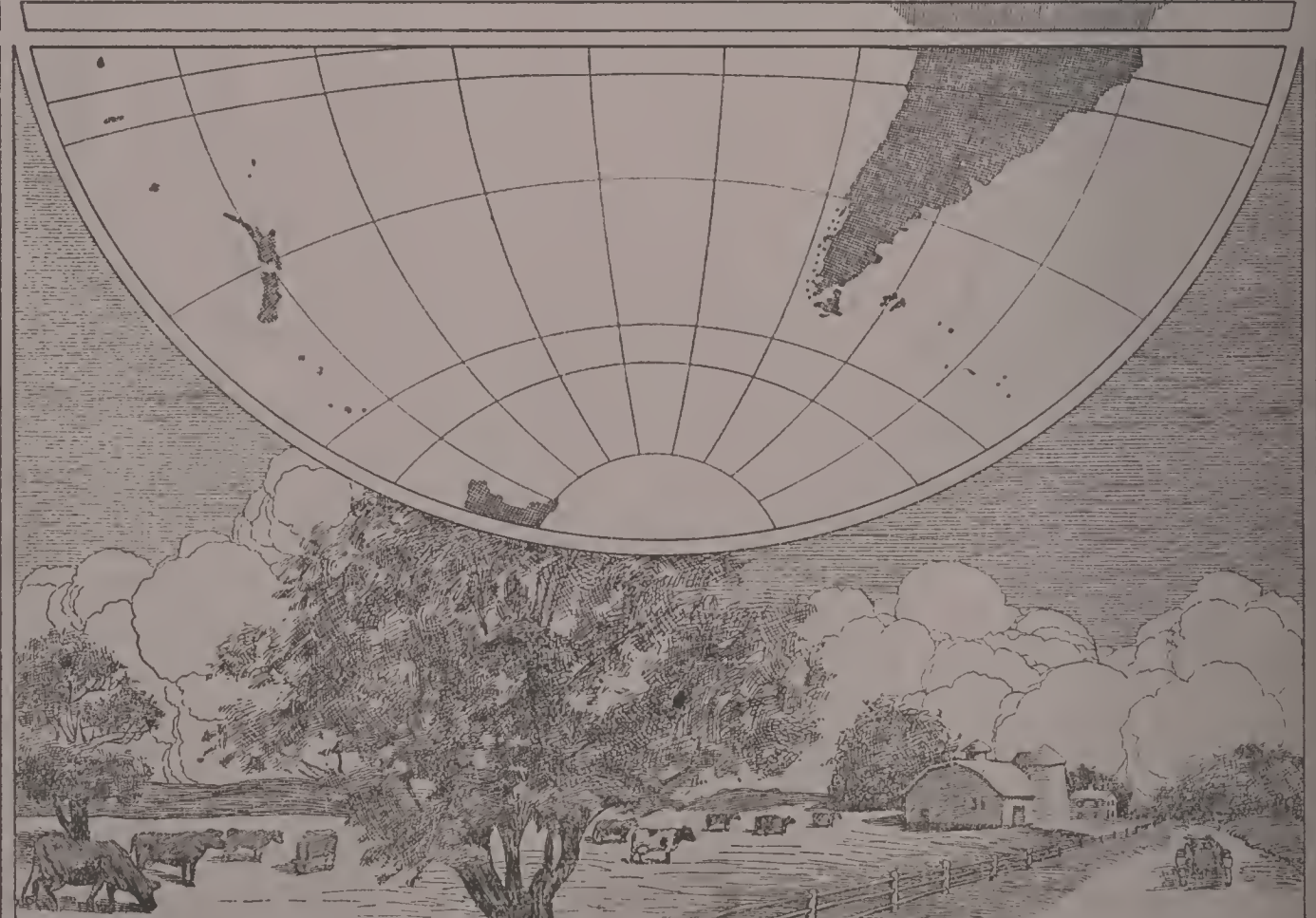
Consult Leaf's *Homer and History;* Saintsbury's *The Flourishing of Romance and the Rise of Allegory.*

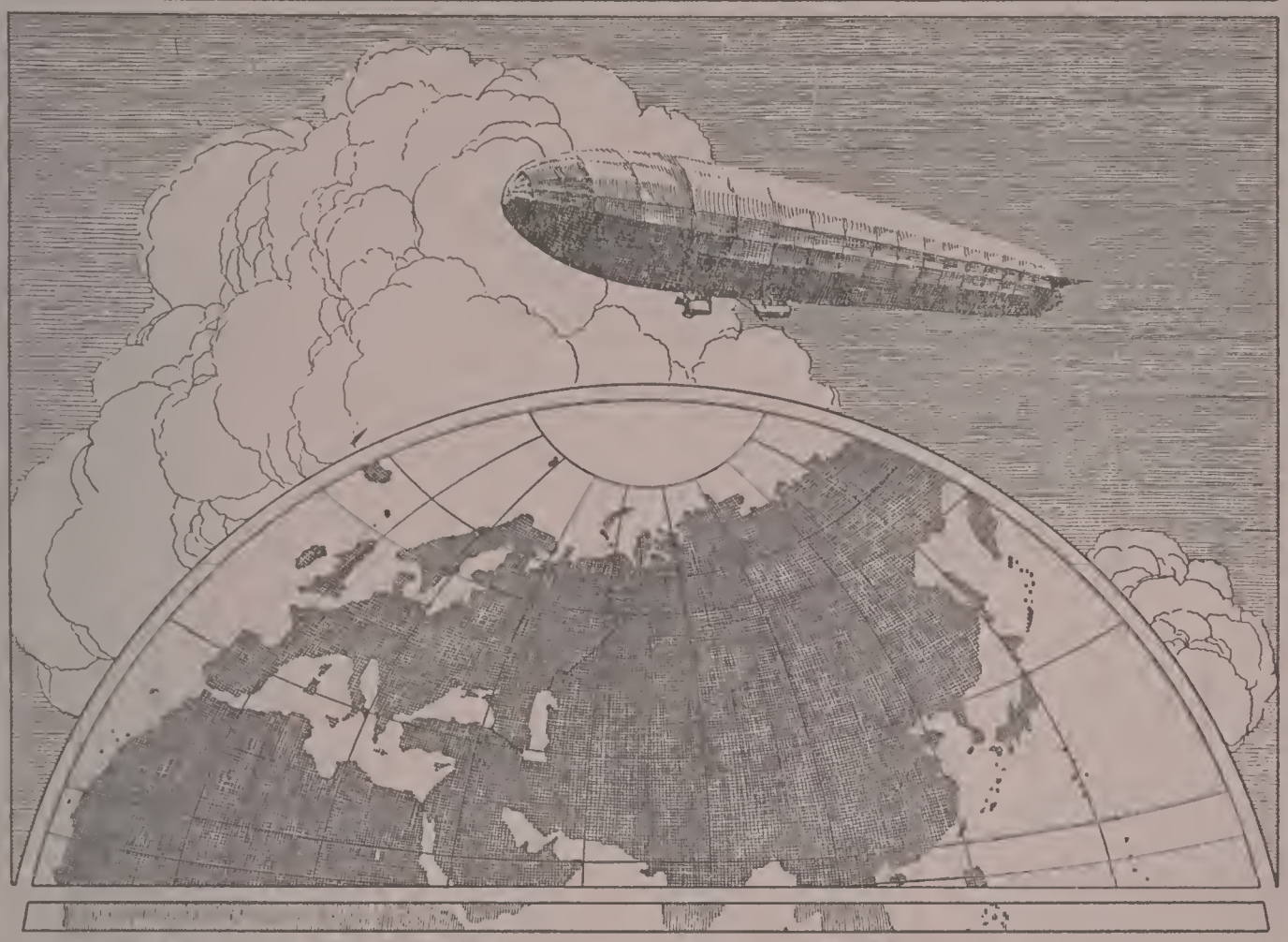
**Related Subjects.** The following articles in these volumes will be of interest in connection with this story of ancient Troy:

| | |
|---|---|
| Achilles | Juno |
| Aeneas | Laocoön |
| Aeneid | Menelaus |
| Agamemnon | Minerva |
| Apple of Discord | Paris |
| Eris | Priam |
| Hector | Thetis |
| Helen of Troy | Ulysses |
| Iliad | Venus |
| Iphigenia | Wooden Horse |

*End of Volume Nine*

# THE WORLD BOOK





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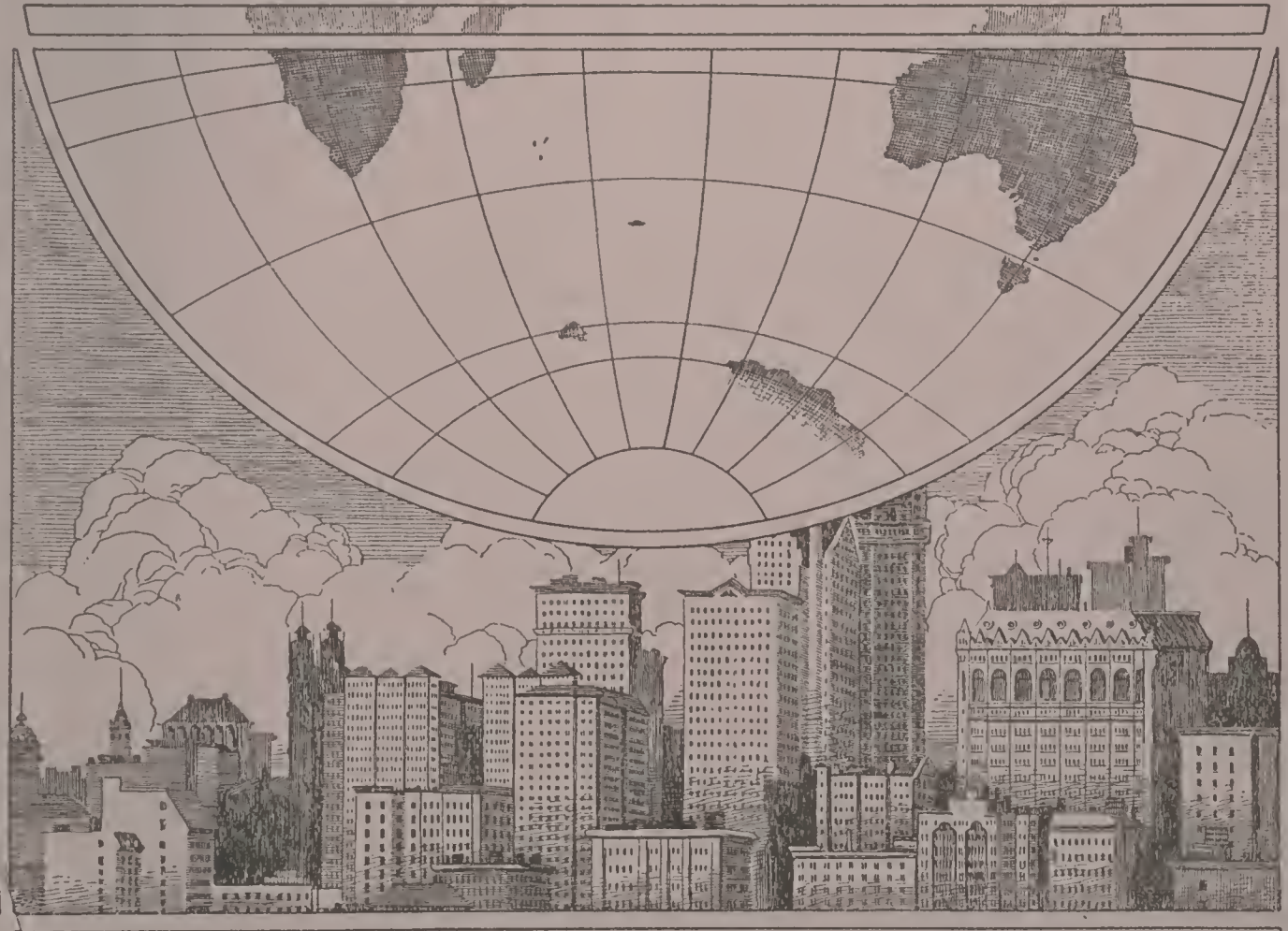

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